8TH INTERNATIONAL CONFERENCE OF FOOD PHYSICISTS PHYSICS AND PHYSICAL CHEMISTRY OF FOOD

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EDITORIAL

This XXI Volume of the Journal of Food Physics is a special one. From 2 points of view. First, this is a proof of our 2 decades activity, because the first issue was published in 1988, i.e. 20 years ago. So with this issue we celebrate our 20 years of existence, as well. Thanks for your kind help, cooperation, support and understanding.

Secondly, this one is a special issue, because this is a proceedings of the 8th International Conference of Food Physics, which was organized in Bulgaria, 24-27 September, 2008, in Plovdiv at the Paisii Hilendarski University. I am sure we had a wonderful and very useful conference with appr. 80 participants from many different countries, from Albania via France to Turkey. As You probably know the first conference we organized in Budapest, Hungary, 1994, followed by the second one in Bucharest, Romania, 1996. The place of the third meeting was Poland, Lublin, 1998, and in 2000 we met in Turkey, Istanbul. Later we decided to organize the conference in Brno, Czech Republic, 2002, and 2 years later, in 2004 we came back again to Hungary, but the place was Pecs. The previous meeting we had in Serbia, in a beautiful small town, Senta, 2006. So we are really happy to have the possibility to continue the organisation of the ISFP conferences, and I myself would like to thank for the excellent work of the bulgarian colleagues taking part in organisation of the 8th ISFP conference in Plovdiv.

This issue gives opportunity also for those, who did not have the possibility to come to Plovdiv, and take part in the work of the meeting, but are interested in some special questions of food physics. The proceedings include not only the oral lectures but the poster presentations, as well. The topics are really wide, from food quality and safety to nondestructive techniques and nanoscience. Unfortunately some authors produced too long manuscripts, so we had to reduce significantly the volume of the papers.

Read and enjoy this issue! And do not forget to prepare for the next ISFP meeting, in Nitra, Agricultural University, Slovakia, 2010.

Prof. A.S. SZABÓ
Editor-in-chief

Plovdiv town

The turkish team of the meeting

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APPLICATION OF FLORAL SCENT ANALYSIS IN THE VERIFICATION OF HONEY AUTHENTICITY

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INTRODUCTION

The price of honey depends on its origin, monofloral honeys being the most highly appreciated. Certain types of honeys have been acknowledged by the European Union as a PDO (Protected Designation of Origin) product, which means among others that the product has unique quality. (*E.g.: Meli Elatis Menalou Vanilia, Mel de Galicia, Miel de Provence.)* Therefore (apart from deliberate honey adulteration, which is a major concern in honey trade and marketing) verification of the floral and geographical origin of a honey is in the focus of honey analysis. There are two main approaches to the problem. The first deals with several composition parameters (sugar ratio, moisture, ash content, enzyme activities etc.) and uses principal component analysis or other statistical devices for categorizing the samples [1]. The second searches for markers of the origin, *e.g.* special components deriving from the flower. [2], [3]
Our work applies this second approach searching for common compounds in the flower and the honey. In the recent study we have investigated three types of honeys and the corresponding flowers searching for identical compounds in them. The honey samples have been purchased from artisanal honey producers and derived from two consecutive harvest seasons. According to the producers' knowledge honeys were monofloral. Flower samples originate from bee pastures near to the nectar collecting fields. The honey samples were stored in screw-capped glass sample jars at room temperature in dark until required for analysis. Flower samples were processed immediately (*i.e.* during the ensuing day of the collection.)

MATERIALS AND METHODS

Sample preparation
Flower samples: Solidago, Tilia, Limonium sp. flowers
200 g sample, homogenization, chopping.
Internal standard: 0.4 mg undecan-1-ol

200 g sample+900 cm^3 distilled water+200 g NaCl (salting out)+internal standard – distillation in modified Likens-Nickerson distillation-extraction apparatus for 1,5 hour, extract in n-pentane
Extract drying over dehydrated sodium sulphate
Extract concentration by evaporation to 1 cm^3
1 ml extract gas chromatographed
Honey samples: Solidago, Tilia, Limonium unifloral honeys
900 g of honey sample+600 cm^3 distilled water+
0.4 mg ISTD+200 g NaCl – distilled according
to the flower method

GC-MS analysis
Instrument: Hewlett Packard 5890/ II GC - 5971A MSD
Column: 60 m x 0.25 mm ID Supelcowax 10 (fused silica)

RESULTS AND DISCUSSION

In the recent study three honey samples have been investigated which some way or other could be regarded as specialities.
Limonium species could be find on saliferous soils and its honey is very rare as monofloral nonetheless it is a delicious honey.
Solidago or goldenrod is a late bloomer, flowering in late summer into the fall and gives beekeepers the last opportunity of collecting honey. Solidago honey therefore appears as monofloral only in the "bad" harvest seasons, when producers are compelled to take advantage of the autumn collecting season. Solidago honey is dense and aromatic.
Linden honey is not exactly rare, but is highley appreciated and a pricey one. The cause is the erratic nature of Tilia trees, which give nectar mainly during the night and therefore beekeepers do not prefer. Because of high price it is prone to be adulterated.

The Likens-Nickerson simultaneous distillation-extraction equipment proved to be very suitable for sample preparation giving solutions rich in volatile components. The GC-MS analysis discovered numerous compounds in the distillates and made possible the characterisation of the samples.

Nevertheless no unique compound has been found in the distillates of the Limonium flower and honey in spite of the abundance of volatile and measurable components. The sample contained only derivatives that are ubiquitous in the plants and are not characteristic of the Limonium species.

In case of linden (Tilia) however three common compounds have been found in the flower and honey distillates. Linden ether (a name from the source, *i.e.* marker), cis-Rose-oxid and Chrysanthenon have not been found yet in any other investigated honey samples. These compounds could be used as marker compounds and could prove the floral origin of the honey.

Goldenrod (Solidago) honeys and flowers show very special volatile spectra due to the presence of sesquiterpene Germacrene D and its derivatives. Germacrene is not uncommon in plants because it is a key intermediate in the biosynthesis of many sesquiterpenes. Literary sources do not however report any occurence of it in honey samples neither it has appeared in our honey samples investigated so far. Germacrene D, delta- Elemene and delta-Cadinene seem to be good marker compounds of the floral origin of Solidago honeys.

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MICROWAVE AND CONVENTIONAL HEATING EFFECTS ON SOME PHYSICOCHEMICAL PARAMETERS OF HIGH OLEIC AND LINOLEIC SUNFLOWER OIL

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ABSTRACT

The effect of microwave heating on some physicochemical parameters and oxidative stability of two sunflower oil (oleic and linoleic type), which have different lipid composition was studied. Each oil was heated by microwave energy of 360, 600 and 900W for 3, 6, 9 and 12 minutes. The results were juxtaposed to the ones, received by conventional heating and duration of 18 minutes. It was determined that by microwave and conventional heating of 900W for of sunflower oil no hydrolysis processes are observed. The oxidation degree in both types of oil increases with the increase of energy and the duration of microwave heating. The peroxide value and the conjugated dienes after 12

min of microwave heating at maximum power increase about 2 times, irrelevant of the fact that the two types of oil have a different oxidation stability and different degree of oxidation. The colour value increases, and the quantity of tocopherols decreases about 1.5 times. The nature of the oxidation changes in conventional heating does not differ significantly from those in microwave heating.

Table 1
Characteristic values and composition of sunflower oil of oleic and linoleic type

Physicochemical characteristic	**Sunflower oil**	
	oleic type	**linoleic type**
Acid value, (mg KOH/g)	0.2±0.01	0.3±0.05
Peroxide value, (meqO_2/kg)	5.8±0.5	14.9±0.5
Tocopherols, (mg/kg)	145±10	336±10
Oxidation stability, (h)	23±0,5	10±0,5
Fatty acids composition, %		
Myristic ($C_{14:0}$)	tr.	0.2±0.1
Palmitic ($C_{16:0}$)	4.2±0.1	7.5±0.1
Palmitoleic ($C_{16:1}$)	tr.	0.5±0.1
Stearic ($C_{18:0}$)	3.0±0.1	4.2±0.1
Oleic ($C_{18:1}$)	81.5±0.1	36.4±0.1
Linoleic ($C_{18:2}$)	11.5±0.1	51.2±0.1

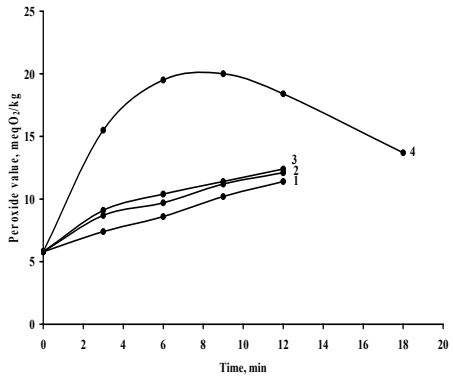

Figure 1
Change of the peroxide value

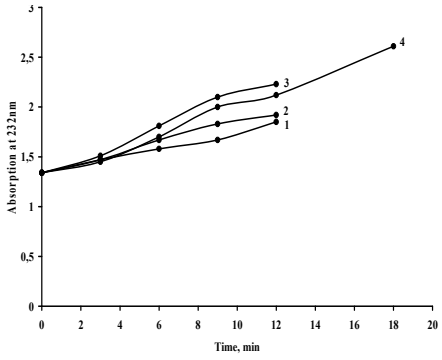

Figure 2
Change of the absorption at 232 nm

Table 2
Basic physicochemical values of sunflower oil (oleic and linoleic type), subjected to microwave and conventional heating for different periods of time and different power

Time	Acid value	Toco-pherols	Lovi-bond	Acid value	Toco-pherols	Lovi-bond
min	mgKOH/g	mg/kg	Colour	mgKOH/g	mg/kg	Colour
	Oleic type sunflower oil			Linoleic type sunflower oil		
0	0.2	145	2.8	0.3	336	4.2
Microwave heating at 360 W						
3	0.3	136	2.8	0.4	326	5.6
6	0.3	131	2.8	0.4	316	5.8
9	0.4	116	2.8	0.5	253	7.4
12	0.4	108	3.4	0.5	243	9.8
Microwave heating at 600 W						
3	0.4	126	2.8	0.4	300	5.4
6	0.4	116	2.8	0.5	286	6.4
9	0.4	110	3.1	0.5	256	9.4
12	0.4	102	4.4	0.5	203	12.6
Microwave heating at 900 W						
3	0.4	120	9.0	0.5	282	5.6
6	0.4	106	9.6	0.5	257	9.4
9	0.4	101	10.8	0.5	231	12.1
12	0.5	98	11.8	0.5	189	13.4
Conventional heating						
6	0.2	136	2.8	0.4	308	4.8
12	0.2	131	4.4	0.4	220	6.4
18	0.3	100	6.0	0.5	200	8.0
SD	±0.01	±10	±0.1	±0.01	±10	±0.1

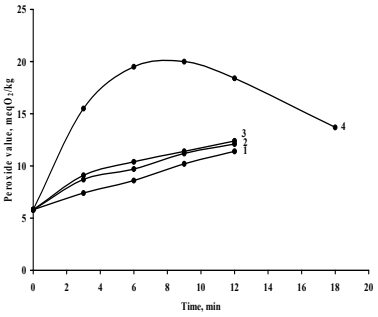

Figure 3
Change of the peroxide value

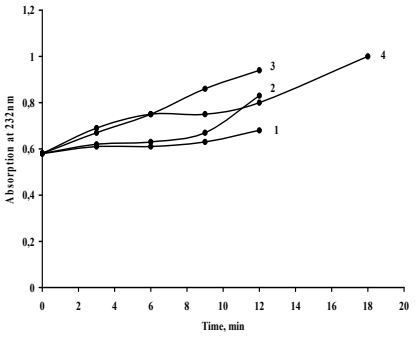

Figure 4
Change of the absorption at 232 nm

MODIFICATION OF THE IRRADIATION EFFECT IN BARLEY PLANTS DURING THE VEGETATION PERIOD

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ABSTRACT

Vegetation pot experiments with spring barley, cultivar *Obzor* were carried out. The plants were grown under controlled conditions and in the phase of "*stem extension*" were irradiated with Cs-137 gamma rays at a dose of 5 Gy and dose intensity of 2 Gy/min.
On the day following the irradiation the plants were sprayed with synthetic growth regulators for the purpose of reducing the irradiation damage. Two types of protectors were tested: *4-Chlorophenoxyacetic acid* and *Phloroglucinol* – in concentration of 10^{-3} M. The degree of the irradiation damage and protection was recorded at the end of the vegetation period following some productivity indexes. The coefficient of protection of the applied modifiers was also determined.
It was established that in case of irradiation of spring barley with a dose of 5 Gy in the phase of stem extension, the reproductive organs were strongly damaged, which led to a considerable reduction of plant productivity.
The application of growth regulators after the irradiation improves to a different degree some of observed indexes, as a result of which the plant productivity is increased about 18% after treated with *4-Chlorophenoxyacetic acid.*

INTRODUCTION

In case of increased environmental radioactivity a necessity arises for urgent evaluation of the radiation situation and on time implementation of protective activities. This imposes availability of preliminary data for varieties depending radiosensitivity of plants as well as looking for possibilities to reduce losses from irradiation. It is determined that radioprotective abilities of plant can be increased and losses of plant production decreased with the help of chemical substances applied before or after irradiation (M. Aliev, 1983; D.M. Grodzinskij, I.N. Gudkov, 1972).

The study aims survey of possibilities for modification of radiation damage with the help of growing regulators after irradiation of barley during vegetation.

MATERIAL AND METHODS

Vegetation pot experiments with spring barley, cultivar *Obzor* were carried out. The experiments were done on Fluvisols/FAO soil in vegetative pots of 5 kg under controlled conditions. After the seeds sprout 15 normally grown plants were left in each pot. Irradiation was done in the most sensitive to radiation phase in cereal ontogenesis "*stem extension*" at a dose of 5 Gy and dose intensity of 2 Gy/min. On the day following the irradiation the plants were treated with two synthetic growth regulators: *4-Chlorophenoxyacetic acid (P-1)* and *Phloroglucinol* (P-2) – in a concentration of 10^{-3} M aiming modification of the radiation damage. The following variants were set: control, plants irradiated with a dose of 5 Gy in the phase of stem extension, irradiated plants treated afterwards with *4-Chlorophenoxyacetic acid*, irradiated plants treated afterwards with *Phloroglucinol,* plants treated with *4-Chlorophenoxyacetic acid* и *Phloroglucinol* only.

Plants were grown to phase of full ripeness. The influence of radiation and the tested modifiers was checked on different characteristics forming plant productivity – plant survival, sterility, height of plants, total tiller, average number and weight of the grains per one plant. The protection coefficient of the applied growth regulators (K_3) was determined also (Grodzinskij, Gudkov, 1973).

The experiments were carried out in 3 repetitions.

RESULTS AND DISCUSSION

The obtained results show that acute gamma-irradiation with a dose of 5 Gy in the most radio-sensitive phase of ontogenesis strongly reduces the tested characteristics forming productivity.

The irradiation suppresses growth, thus decreasing the height of the irradiated plants. Some authors (Hillman, 1961) associate the suppressing of vegetation with the suppressing of aucsines synthesis and other physiologically active growth substances but according to others (Medvedev, 1970) the reason is accumulation of abnormal metabolites and inhibitors of growth. Stimulation of tiller for the irradiated variants compared to the control is observed. The survival index is not influenced by the irradiation because of the late phase in which irradiation was done and fading of growth processes. 100% outlasted plants are reported 23, 81% of which sterile. The number and weight of grains obtained average per plant decrease with 42.52% and 34.03% respectively compared to

the unirradiated control. The productivity of the irradiated plants strongly decreases – with 43,74% compared to the control.
The considerable reduction of barley productivity due to radiation is an evidence for strong suppression of the meiotic processes and injury of the generative organs during influence at this phase of ontogenesis. The results obtained correspond to the research of Grodzinski D.M. 1989, that in plant ontogenesis the stages of morphogenesis associated with the formation of generative organs characterize with lowest radioresistence.
The results show, that the application of *Phloroglucinol* has insignificant influence on the indices associated with productivity.

The growth regulator studied does not stimulate the tiller of the irradiated plants. The percentage of sterile plants decreases insignificantly – with about 2% for those treated with the radiomodificator. The average number of grains per plant increases with 17.45%, while the weight of the grains obtained increases with just about 6,25%. This impacts also on the productivity of the plants restored which increases with only 6% compared to the irradiated and untreated variants.
The treatment of plants with *4-Chlorophenoxyacetic acid* after irradiation insignificantly affects the height of the irradiated variants. The tiller is not stimulated and the average number of the grains obtained increases with 14,4%. The average weight of grains per plant increases with 18,4% compared to the variant without treatment. The sterility reduces with about 5%. As a result the plant productivity increases with about 18%. A relatively high protection coefficient – 1,36 is recorded in this variant as well.
The results obtained by us confirm the statement that the modifying effect of different substances causing decrease of damaging effect of radiation is strongest during the period of reduced radioresistance of plants, when the potential abilities for protection and recovery are to the greatest extend manifested / Grodzinskij, D.M 1973; Aliev I.M.1983/.
The following conclusions can be done regarding the results of our research on radiosensitivity of spring barley cultivar *Obzor* and growth regulators studied for reduction of irradiation damage:
1 Irradiation of spring barley with a dose of 5 Gy in the phase of "*stem extension*" strongly damages the reproductive organs, which causes considerable reduction of plant productivity.
2. The treatment after irradiation with the growth regulators studied improves to a different extent of some yield indices like sterility, number and weight of the grains obtained. Therefore the productivity increases with 18% after treatment with *4-Chlorophenoxyacetic acid.*

Application of *4-Chlorophenoxyacetic acid* considerably influences the productivity of the irradiated plants and therefore its use in the practice for irradiated sowing can be recommended.

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SOME THERMOPHYSICAL CHARACTERISTICS OF MILK AND MILK PRODUCTS

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This article deals with thermophysical characteristics of milk and milk products. If we want to protect quality of food we need to know its physical properties. One of the most important are thermophysical parameters as temperature, thermal conductivity and thermal diffusivity. For thermophysical parameters measurements was used PS method and also Hot Wire method. In the first series of measurements we measured relations between thermal conductivity and thermal diffusivity in temperature range (5–25) C for milk. In the second series of measurement was measured relation between thermal conductivity and relative fat content for milk. There were also measured some thermophysical parameters of cheese, processed cheese and acidophilus milk. The results of measurements for milk samples showed that temperature stabilisation process and relative fat content have influence to variation of thermophysical parameters. All measured relations for milk samples during temperature stabilisation have linear increasing progress – fig. 2-3. Figure 4 shows that

increasing relative fat content has decreasing influence on milk thermal conductivity. Results for other milk products are summarised in table 1.

Table 1
Results of thermal conductivity and thermal diffusivity measurements for selected milk products

Sample	Thermal Diffusivity [m^2/s]	Thermal Conductivity [W/m .K]
Acidophilus milk	18.5 x E-8	0.51
Processed cheese	16.5 x E-8	0.71
Cheese	15.1 x E-8	0.63

$$\Delta(r,t) = \frac{q}{4\pi\lambda} \ln \frac{4at}{r^2 C} \tag{1}$$

Where: λ – the thermal conductivity, a – thermal diffusivity, $C = \exp(\gamma)$ with γ the Eulers´constant. The thermal conductivity is calculated from the slope S of the temperature rise $\Delta T(r,t)$ *vs.* the natural logarithm of the time $\ln t$ evolution using the formula

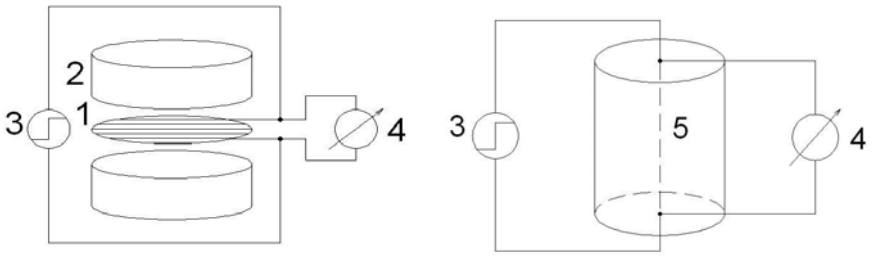

Figure 1
Plane source method Hot wire method
1 – PS sensor, 2 – samples, 3 – current source, 4 – milivoltmeter,
5 – heat source and thermometer

$$\lambda = \frac{q}{4\pi S} \tag{2}$$

$$\Delta T(x,t) = 2\frac{q\sqrt{at}}{\lambda} ierf\left(\frac{x}{2\sqrt{at}}\right) \tag{3}$$

Where a is thermal diffusivity, λ is thermal conductivity of the sample and *ierfc* is the error function [3].

$$T(0,t) = \frac{q\sqrt{a}}{\lambda\sqrt{\pi}}\sqrt{t} \tag{4}$$

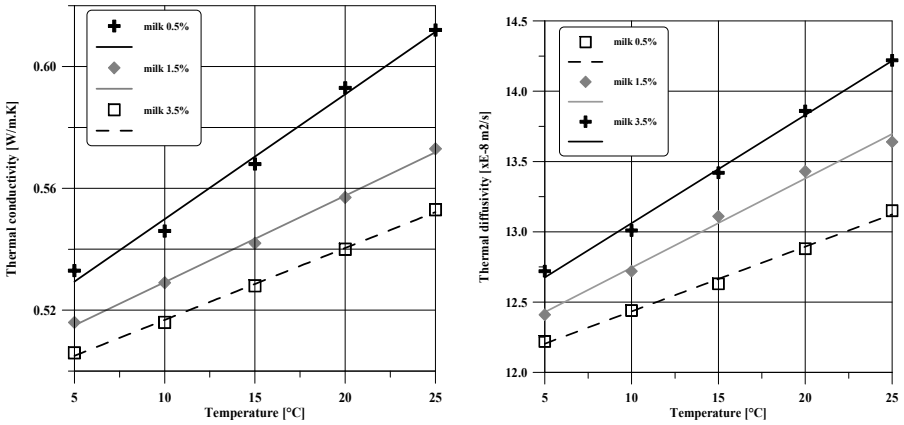

Figure 2-3
Relations of thermal conductivity and thermal diffusivity
to temperature for milk with different relative fat content

INSTRUMENTAL MEASURING OF COLOUR AS A MARKER OF ORIGIN OF SOME VARIETIES OF POTATOES

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ABSTRACT

In this work are described results of first year of research of spectrofotometric measuring of colour. We observed an improvement of instrumental measuring of colour as a marker of origin of some varieties of potatoes.
We tested ten varieties of potatoes. The potatoes were tested raw and boiled. Three raw potato tubers were parted in two pieces in transverse and lengthwise direction. Every half was measured in three repetition. In the same way were prepared other three raw and three boiled potatoes which were measured over the PE sheeting.
The optical system is using diffused illustration and reflected light is measured under coal 8°(d/8) with SCE function (specular component excluded) for elimination of mirror radiance. Slot diameter is 30 nm.
All spectrum between 380-780 nm was measured. The colour is defined in L*a*b* colour system (CIELab).
The first record shows that it is possible to diagnose the varieties of potatoes only by spectrophotometical measuring of colour. Just now we are trying to confirm this in other tests in In-house grant of Mendel University.

INTRODUCTION

There is lot of causes why to check quality of food. In cause of potatoes is point to check mainly its varieties. Quickness, simplicity, low costs and scarcely any other special requirements to serve person – this is a few basic conditions to implant new method to practice.
Our Method - spektrofotomectric measuring of colour fulfil all this condition. The difference between spectrophotometric and colourimetric measuring of colour is that the spectrophotometric measuring defined the colour of the object like the human eye seems it. Spectrophotometric measuring does it too, but in addition it measures all spectrum between 380-780 nm and the colour is defined in L*a*b* colour system (CIELab). So we can find unique part of spectrum if it exists and describe for example origin of some varieties of potatoes.

MATERIALS AND METHOD

Ten varieties of potatoes were tested (Aneta, Rosara, Korela, Lolita, Jitka, Ditta, Red Anne, Katka, Karin a Keřkovské rohlíčky).
Preparation of samples:
The potatoes were tested raw and boiled. Three raw potato tubers were parted in two pieces in transverse and lengthwise direction. Every half was measured in

three repetition. In the same way were prepared other three raw and three boiled potatoes which were measured over the PE sheeting.
Boiled samples were boiled 15 minutes.
The optical system is using diffused illustration and reflected light is measured under coal 8 (d/8) with SCE function (specular component excluded) for elimination of mirror radiance.
Slot diameter is 30 mm.
All spectrum between 380-780 nm was measured. The curve of measured spectrum of one sample is on Fig. 1.

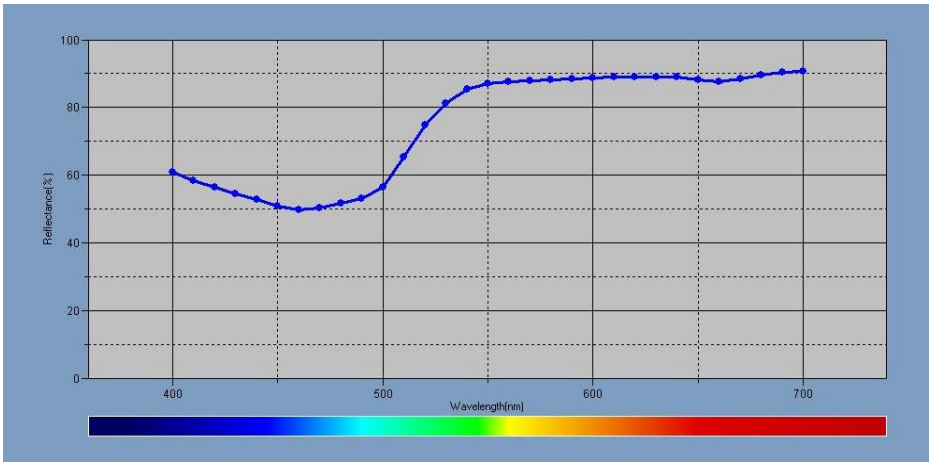

Figure 1
The curve of spectrum between 380 -780 nm

The colour is defined in L*a*b* colour system (CIELab). (Fig. 2) In this system value L* is luminance and values a* and b* are axis of colour. + a* is red direction, -a* is green direction, + b* is yellow direction and -b* is blue direction.

RESULTS AND DISCUSSION

It was used ten varieties of potatoes. From every variety was choose 12 samples. Six Samples were boiled, other six we used raw. Three samples from each groups we cut in cross direction and other three in longitudinal. Each half of sample was measured three times. So we got 72 measurement from each variety of potatoes.

For statistic characterising we use Tukey-B test. It shows that origin of variety of potatoes can be defined for P<0,05 on base of measurement of a* dates (red colour area).

This dates can not be use like conclusive. We have to confirm our first results in few harvest and take into account other factors like different growing plans, area, weather, stocking etc.

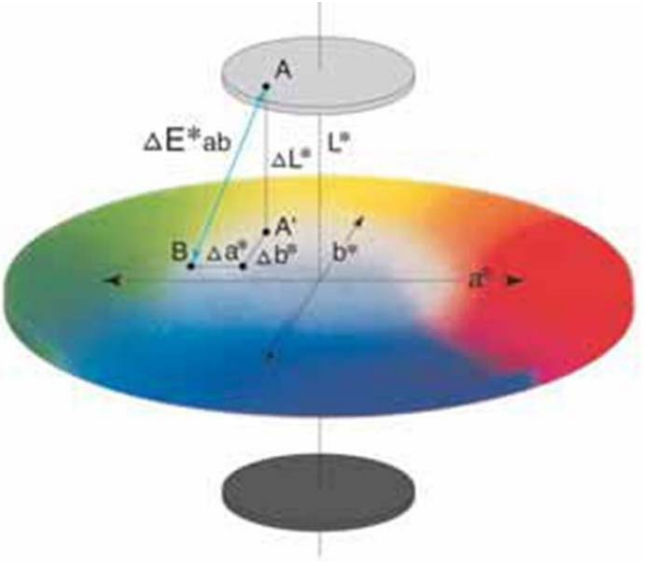

Figure 2
L*a*b* colour system

ACOUSTICS METHOD OF THE CHEESE RIPENING EVALUATION

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ABSTRACT

The paper is focused on the study of the feasibility of using the acoustic impulse-response technique to evaluate Edam cheese texture and maturity. Cheese blocks were hit with an impact bar and the acoustic response at the eight points on the cheese surface was recorded. The response signals (impact force, surface displacement and surface velocities) were detected by the laser-vibrometers. In connection with the results of the classical compression tests performed on the tested cheeses the constitutive equation of the cheese behaviour has been designed. This equation has been used in the numerical simulation of the cheese block response. This simulation has been performed using of the LS DYNA 3D finite element code. The numerical results show reasonable agreement with experimental ones.

INTRODUCTION

The texture of the cheese are traditionally determined by destructive sensory and instrumental measurements. Texture Profile Analysis (TPA), uniaxial compression and puncture tests have been widely used to assess cheese texture, providing information on both the deformation and fracture properties of food products. At present, new non-destructive techniques such as small displacement probes, vibrating rheometers, near infrared spectroscopy (NIR), computer vision, biosensors, ultrasonic analysis and sonic measurements are more and more used. One of these non destructive methods is the acoustic impulse–response technique where the food is excited by being struck with a probe and the response functions are obtained. This technique was used to detect surface cracks in eggshells or voids in watermelons (Cho,2000). Furthermore, this methodology has been applied on fruits such as peaches, apples and pears, in order to quantify changes in firmness during ripening.

These ultrasonic techniques were also used to assess the degree of Manchego cheese maturity (Benedito et al., 2006). The texture of some other cheeses like Mahon or Cheddar cheese has been also studied. The acoustic impulse –response technique used for the study of the cheeses has used response function in form of sound waves detected by the microphones. In the given paper the modified technique has been used where the response of the cheese is described by the time histories of the surface displacement and surface velocity.

MATERIALS AND METHODS

The experiments were carried out on blocks of Certified Origin EDAM cheese (Content of the fat 30%), manufactured by a company located in South Moravia.

The pieces were matured in chambers where relative humidity and temperature were maintained according to the company procedures. The blocks of cheese have been tested at 16,39,60,79 and 107 days after the production.
Two types of the experiments have been realized. First of all the simple compression and stress relaxation tests have been performed using of the TIRA testing device. The crosshead velocities have been chosen to be 1,10,100 and 400 mm/min. Results of these tests have been used to obtain the constitutive parameters of the non-linear viscoelastic materials like cheeses etc. The details of this procedure are described in (Goh et al.,2004).
The impact tests were carried out using an impact device specially designed and built for cheese measurements. The impact set-up consisted of a free-falling cylindrical bar(6 mm in diameter, 200 mm in height – made from aluminium alloy). The bar is instrumented by strain gauges . This instrumentation enables to record the time history of the force at the interface between cheese and bar. At the distances 30, 45, 60,75, 90, 105, 120 and 135 mm from the point of the bar impact the surface displacement as well as the surface velocity are measured using of the laser-vibrometer.
The cheese response was picked up through an amplifier and a commercial A/D PC board to the PC, which simultaneously served as the data acquisition system. An optical sensor was used to trigger the acquisition. The signal was sampled at a rate of 200,000 samples/s for a period of 15 ms. Instead of the time dependent response functions, the MATLAB computer program transformed the response from time to frequency domain by means of Fast Fourier Transform (FFT). The impact velocity of the bar has been kept to be constant (1.2 m/s).

RESULTS AND DISCUSSION

In the Fig.1 the experimental records of the surface displacement - time are displayed. This displacement is connected with the propagation of the surface wave from the point of the impact. The results show that the surface wave exhibits the significant attenuation in the direction of the stress wave propagation. This attenuation also increases with the time of the cheese ripening – see Fig.1. This phenomenon indicates that the behaviour of the cheese is more or less viscoelastic. The damping of the stress wave in the direction of its propagation can be also described in the frequency domain .If we substitute the displacement p(t) by its Fourier transform P(ω), where ω is the angular frequency we can define the transfer function T(ω) :

$$T(\omega) = \frac{dP(\omega)}{dx}$$

Where x is the distance in the direction of the wave propagation

The transfer function amplitude is also studied. The analysis of the experimental data found that this dependence was typical for the different stages of the cheese ripening. One can see that the description of the wave attenuation in the frequency domain is more simple than that in the time domain.

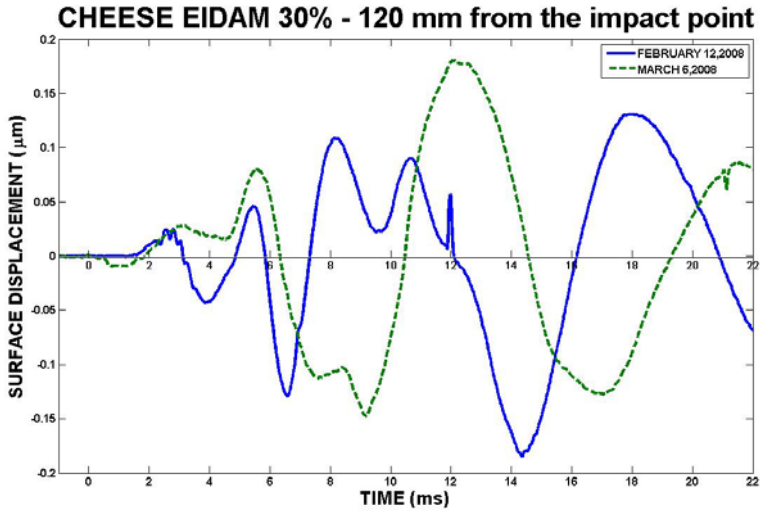

Figure 1.
Surface displaement vs.
Time at the point x=90 mm from the point of the bar impact.

In the next step the displacement at the different points has been evaluated using of the constitutive equation obtained from the simple compression and relaxation tests. According to the procedure outlined in (Goh et al.,2004) the parameters of the non-linear viscoelastic model have been evaluated. The detail description of this work will be subject of the forthcoming papers. The obtained model of the cheese mechanical behaviour has been used for the numerical simulation of the experiments

Generally one can see that the proposed method of the cheese properties evaluation seems be a promising tool for the next research. There is only one critical limitation of this procedure which follows from the role of the stress wave propagation. The origin of some voids or some holes in the cheese can effects the wave propagation much more significantly than some changes of the cheese texture, e.g. during its ripening. The presence of the holes in the cheese on the stress wave propagation should be a subject of some next research.

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DETERMINATION OF SOME PHYSICAL AND SENSORY PROPERTIES OF MILK, DARK AND WHITE CHOCOLATES ENRICHMENT WITH SUNFLOWER SEED, FLAX SEED, OAT AND DRIED DAMSON PLUM

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Table 1
Melting point and texture properties of enrichment chocolate samples[1]

Enrichment chocolate samples	Melting point (^{0}C)	Hardness (kg force)
White chocolate	29.13±0.12^a	1.91±0.09^b
White chocolate with flaxseed	22.67±0.42^d	2.00±0.09^a
White chocolate with sunflower seed	21.93±0.21^e	1.75±0.03^c
White chocolate with oat and rice	27.07±0.06^c	1.88±0.01^b
White chocolate with damson plum	27.20±0.17^b	1.63±0.01^d
Milk chocolate	29.97±0.06^a	2.90±0.05^a
Milk chocolate with flaxseed	27.03±0.06^d	2.39±0.07^c
Milk chocolate with sunflower seed	26.00±0.10^e	2.39±0.00^c
Milk chocolate with oat and rice	28.27±0.06^c	2.68±0.00^b
Milk chocolate with damson plum	29.10±0.10^b	2.41±0.13^c
Dark chocolate	30.57±0.06^a	3.51±0.01^a
Dark chocolate with flaxseed	27.03±0.06^d	3.25±0.03^c
Dark chocolate with sunflower seed	26.77±0.25^e	2.79±0.05^e
Dark chocolate with oat and rice	29.57±0.06^c	3.45±0.01^b
Dark chocolate with damson plum	29.93±0.06^b	2.88±0.18^d

[1] Measurements were done at 20°C, mean of five determinations ± SD, means followed by the same letter within each coloumn are significantly different at $p<0.05$ level (Duncan's multiple range test)

Chocolate and cocoa products are preferred by a large community and as well as being a pleasure to eat. In the last decade, the studies about all sort of chocolate enrichment with functional foods during the shelf life are very limited. And in the examined works, there are no declarations about chocolate enrichment with sunflower seed, flax seed, oat and dried damson plum.The aim of this project is enrichment the milk, dark and white chocolates with sunflower seed, flax seed, oat and dried damsonplum, and determine some physical, and sensory properties of enrichment milk, dark and white chocolate.

Table 2. *L*, a*, b** values of enrichment chocolate samples [1]

Enrichment chocolate samples	***L****	***a****	***b****
White chocolate	81.09±*0.05*^{a}	-3.86±*0.02*^{c}	26.07±*0.21*^{a}
White chocolate with flaxseed	71.75±*0.13*^{e}	-3.70±*0.00*^{b}	16.65±*0.01*^{e}
White chocolate with sunflower seed	77.46±*0.07*^{b}	-4.87±*0.02*^{d}	21.49±*0.05*^{c}
White chocolate with oat and rice	73.38±*0.20*^{d}	-0.83±*0.27*^{a}	22.25±*0.08*^{b}
White chocolate with damson plum	75.96±*0.92*^{c}	-5.00±*0.16*^{e}	20.99±*1.23*^{d}
Milk chocolate	35.22±*0.05*^{a}	6.44±*0.01*^{c}	9.06±*0.05*^{c}
Milk chocolate with flaxseed	34.71±*0.35*^{b}	6.78±*0.19*^{b}	9.30±*0.18*^{b}
Milk chocolate with sunflower seed	34.97±*0.60*^{c}	6.72±*0.06*^{b}	9.19±*0.12*^{b}
Milk chocolate with oat and rice	34.70±*0.04*^{b}	8.65±*0.08*^{a}	11.72±*0.00*^{c}
Milk chocolate with damson plum	34.34±*0.42*^{d}	6.34±*0.17*^{d}	8.77±*0.06*^{d}
Dark chocolate	29.71±*0.08*^{a}	2.73±*0.08*^{e}	3.98±*0.14*^{c}
Dark chocolate with flaxseed	29.74±*0.23*^{a}	3.32±*0.11*^{b}	4.41±*0.15*^{b}
Dark chocolate with sunflower seed	29.36±*0.25*^{b}	3.06±*0.10*^{c}	4.04±*0.03*^{c}
Dark chocolate with oat and rice	27.72±*0.02*^{c}	4.94±*0.03*^{a}	5.33±*0.02*^{a}
Dark chocolate with damson plum	29.24±*0.02*^{d}	2.85±*0.20*^{d}	4.03±*0.14*^{c}

[1] Measurements were done at 20°C, mean of five determinations ± SD, means followed by the same letter within each coloumn are significantly different at $p<0.05$ level (Duncan's multiple range test)

Table 3. Sensory attributes of enrichment chocolate samples[1]

Enrichment chocolate samples	**Appearance**	**Texture**	**Flavour**	**Overall acceptability**
White chocolate with flaxseed	5.00±*0.00*^{a}	3.00±*0.00*^{a}	5.00±*0.00*^{a}	4.50±*0.53*^{c}
White chocolate with sunflower seed	4.75±*0.46*^{c}	3.00±*0.00*^{a}	5.00±*0.00*^{a}	4.88±*0.35*^{a}
White chocolate with oat and rice	5.00±*0.00*^{a}	3.00±*0.00*^{a}	5.00±*0.00*^{a}	4.88±*0.35*^{a}
White chocolate with damson plum	4.88±*0.35*^{b}	3.00±*0.00*^{a}	5.00±*0.00*^{a}	4.75±*0.46*^{b}
Milk chocolate with flaxseed	5.00±*0.00*^{a}	3.00±*0.00*^{a}	5.00±*0.00*^{a}	4.38±*0.74*^{c}
Milk chocolate with sunflower seed	5.00±*0.00*^{a}	3.00±*0.00*^{a}	5.00±*0.00*^{a}	4.75±*0.46*^{b}
Milk chocolate with oat and rice	5.00±*0.00*^{a}	3.00±*0.00*^{a}	5.00±*0.00*^{a}	5.00±*0.00*^{a}
Milk chocolate with damson plum	4.89±*0.33*^{b}	3.00±*0.00*^{a}	5.00±*0.00*^{a}	5.00±*0.00*^{a}
Dark chocolate with flaxseed	5.00±*0.00*^{a}	3.00±*0.00*^{a}	4.86±*0.38*^{b}	4.43±*0.53*^{c}
Dark chocolate with sunflower seed	5.00±*0.00*^{a}	3.00±*0.00*^{a}	5.00±*0.00*^{a}	4.86±*0.38*^{b}
Dark chocolate with oat and rice	5.00±*0.00*^{a}	3.00±*0.00*^{a}	5.00±*0.00*^{a}	5.00±*0.00*^{a}
Dark chocolate with damson plum	5.00±*0.00*^{a}	3.00±*0.00*^{a}	5.00±*0.00*^{a}	5.00±*0.00*^{a}

[1]Means followed by the same letter within each coloumn are significantly different at $p<0.05$ level (Duncan's multiple range test)

USE PHYSICAL AND CHEMICAL PARAMETERS FOR THE CHARACTERISTIC OF HONEY QUALITY

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ABSTRACT

For the characteristic of honey quality it is possible to use different physical and chemical parameters. For example, activity of enzymes, the content of sugars, etc. The content of carbohydrates in honey is very diverse. It depends on kinds of honey and many other things factors. The content of sugars in honey allows define quality of honey and also characterizes specific properties of honey. Activity of enzyme invertase also as activity of enzyme amylases depends from heating and storage of honey. Therefore invertase can serve as a parameter of quality of honey. Amino acid proline is one of the main amino acids of honey. Natural honey should contain this acid. Therefore definition the content of proline in honey can serve as a parameter of quality of honey. Each carbohydrate has a specific angle of rotation of polarized light (specific rotation). It depends on relations and content of carbohydrates in honey.

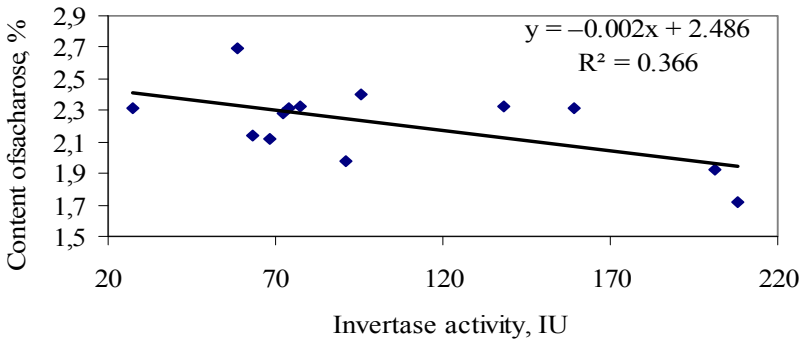

Figure 1
Influence of invertase activity in honey on the content of sacharose.

The aim of the present research was to establish the relationship between honey sorts and content of carbohydrates as well as specific rotation and possibilities of using these criteria (content of carbohydrates, specific rotation, and activity of invertase) for characterization of honey quality. Following parameters were determined with different physical – chemical methods: specific rotation – by method of polarimetry, content of sugars with high pressure liquid chromatography, activity of invertase and content of proline – spectrophotometrically. The obtained results indicated that content of carbohydrates partially dependent on honey sorts. Content of sacharose depends from invertase activity in honey. Invertase is good parameter for honey characterization. Specific angle of rotation of polarized light is not available for identification of honey sorts.

Table 1
Content of carbohydrates in honey, %

Kinds of honey	Place of gathering	Content of carboxydrates, %			
		Sach.*	Gluc.*	Fruc.*	Malt.*
Various flowers	Ludza	2.32	33.13	38.64	2.08
Various flowers	Jekabpils	1.92	35.23	37.10	3.92
Various flowers	Cesis	2.28	36.13	36.17	3.02
Wild flowers	Cesis	2.12	33.09	41.74	2.73
Wild.flowers	Madona	2.31	33.93	35.32	4.95
Lime blossom	Riga	1.98	35.21	37.72	1.95
Lime blossom	Talsi	2.17	36.31	38.04	2.11
Dropwort flow.	Valka	2.14	33.17	40.50	3.81
Heather flowers	Limbazi	2.40	30.20	37.97	2.24
Meadow flowers	Riga	2.32	44.58	36.94	1.21
Buckwheat flow.	Saldus	1.72	33.53	38.69	2.62
Phacelia flowers	Jelgava	2.31	35.25	40.52	1.03
Sweet flowers	Riga	2.69	35.86	37.30	4.99

Kinds of honey	Place of gathering	Content of carboxydrates, %		
		Turan.*	Malttr.*	Meliz.*
Various flowers	Ludza	2.14	0.09	0.96
Various flowers	Jekabpils	2.18	0.62	0.56
Various flowers	Cesis	1.83	0.12	0.10
Wild flowers	Cesis	1.17	0.65	0.67
Wild.flowers	Madona	2.26	2.22	0.02
Lime blossom	Riga	2.12	0.82	0.35
Lime blossom	Talsi	1.83	0.72	0.56
Dropwort flow.	Valka	1.38	-	0.61
Heather flowers	Limbazi	3.78	1.46	0.82
Meadow flowers	Riga	0.97	0.44	-
Buckwheat flow.	Saldus	0.92	0.09	
Phacelia flowers	Jelgava	5.01	1.09	0.97
Sweet flowers	Riga	1.80	0.21	0.11

* Sach. – sacharose; Gluc. – glucose; Fruc. – fructose; Malt. – maltose; Turan. – turanose; Malttr. – maltotriose; Meliz. – melizitose.

RESPONSE SURFACE METHODOLOGY IN RHEOLOGICAL CHARACTERIZATION OF QUINCE PUREE

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Table 1
Independent variables and their coded and actual values used in the experiments

Independent variable	Units	Symbol	Coded levels		
			-1	0	+1
Temperature	°C	X_1	25	50	75
pH		X_2	3.0	3.5	4.0
Total solids	% (w/w)	X_3	10	14	18

Rheological properties of quince puree were investigated with respect to processing conditions by using response surface methodology. Effects of total solids content (10-18%), pH (3-4) and temperature (25-75°C) that could be encountered during processing on rheological properties of quince puree were determined in a central composite design. Flow behavior of quince puree was

found to be pseudoplastic that could be described by Herschel-Bulkley model under all conditions studied. Temperature and total solids content were found effective on the consistency coefficient of quince puree. Yield stress of quince puree was found to change with pH and total solids content.

Table 2.
erimental design and data for the responses; consistency index (k), flow index (n), yield stress (τ_o) and thixotropy of quince puree under different conditions

T (^oC) (*X1*)	**pH** (*X2*)	**C (%)** (*X3*)	**k ($Pa.s^n$)** (*Y1*)	**n** (*Y2*)	**τ_o (Pa)** (*Y3*)	**Thixotropy (Pa/s)** (Y_4)
25	4	10	2.2	0.49	3.6	23
25	3	18	18.8	0.38	71.2	2472
75	4	18	6.1	0.48	36.8	1091
50	3.5	14	5.2	0.43	13.0	664
50	3.5	14	5.3	0.43	14.5	654
75	3	10	0.8	0.54	4.6	3
50	3.5	14	4.5	0.46	14.6	587
75	3	18	4.5	0.51	37.6	1426
50	3.5	14	4.7	0.46	12.7	474
25	3	10	2.0	0.50	4.1	58
75	4	10	1.0	0.52	3.5	2
25	4	18	29.1	0.33	49.0	2694
50	3	14	3.3	0.49	20.8	870
25	3.5	14	9.4	0.39	18.0	746
50	3.5	18	9.8	0.46	46.5	1587
50	3.5	14	4.9	0.45	17.1	692
50	3.5	14	4.9	0.46	19.9	736
50	4	14	4.6	0.45	20.4	797
50	3.5	10	1.3	0.51	2.1	36
75	3.5	14	3.7	0.43	8.4	412

Thixotropy in the samples decreased with increase in temperature. Interactive effects of some processing parameters were found significant on consistency coefficient, yield stress and thixotropy of quince puree. Rheological properties of quince puree were found to depend on processing conditions.

$$\tau = \tau_0 + K(\dot{\gamma})^n \qquad \text{(Equation 1)}$$

where, τ is the shear stress (Pa), τ_0 is the yield stress (Pa), $\dot{\gamma}$ is the shear rate (s^{-1}), k is the consistency index ($Pa.s^n$) and n is the dimensionless flow behaviour index.

$$Y = b_0 + \sum_{n=1}^{3} b_n x_n + \sum_{n=1}^{3} b_{nn} x_n^2 + \sum_{n=m=1}^{3} b_{nm} x_n x_m \qquad \text{(Equation 2)}$$

where the coefficients of the polynomial were represented by b_0 (constant term); b_1, b_2 and b_3 (linear effects); b_{11}, b_{22} and b_{33} (quadratic effects); and b_{12}, b_{13} and b_{23} (interaction effects).

Table 3.
Regression coefficients and correlation coefficient (R^2) for the response functions†

Coefficient of independent variables	**k ($Pa.s^n$)** (Y1)	**n** (Y2)	**τ_o (Pa)** (Y3)	**Thixotropy (Pa/s)** (Y4)
b_0	6.646	1.163	1.834	0.246
T (X1) (b_1)	-0.35	-0.004	0.192	**-57.95***
pH (X2) (b_2)	1.646	-0.173	**-42.422***	-51.71
C (X3) (b_3)	**4.29***	-0.043	-2.488	73.76
TxT (X1xX1) (b_{11})	**-0.003***	-0.003	-0.003	-0.071
pHxpH (X2xX2) (b_{22})	-1.816	0.0311	**-20.81***	11.87
CxC (X3xX3) (b_{33})	**0.316****	0.001	**0.558***	**847.94***
TxpH (X1xX2) (b_{12})	-0.024	0.004	**0.209***	-5.24
TxC (X1xX3) (b_{13})	**-0.062****	0.002	**-0.058***	**-3.22****
pHxC (X2xX3) (b_{23})	0.345	-0.005	**-1.338***	-4.74
R^2	**0.995**	**0.971**	**0.991**	**0.984**

† b: coefficients of polynomial equation; b_0 (constant); b_1. b_2 and b_3 (linear effects); b_{11}. b_{22} and b_{33} (quadratic effects); and b_{12}. b_{13} and b_{23} (interaction effects). (* Significant at $p \leq 0.05$. ** Significant at $p \leq 0.001$.)

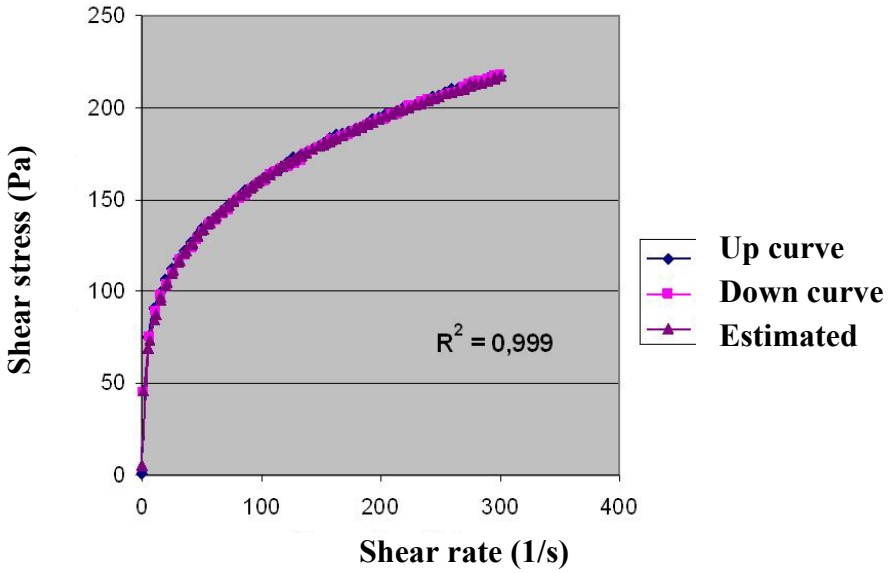

Figure 1
Experimental and estimated (Herschel-Bulkley model)
flow curve of quince puree at 18% total solids, pH 4 and 25°C.

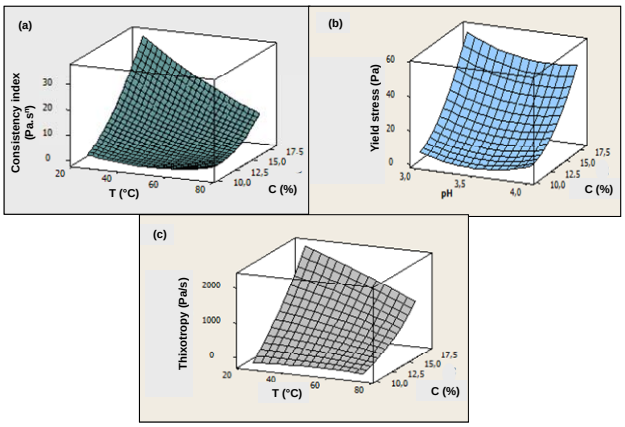

Figure 2
Interactive effects of processing parameters on consistency index (a),
yield stress (b) and thixotropy (c) of quince puree

CHANGES IN RHEOLOGICAL AND FOOD-CHEMICAL PARAMETERS IN SWEET MELON VARIETIES DURING THE POST-HARVEST TREATMENTS.

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ABSTRACT

The aim of our research was to study the effect of the different storage system different post-harvest handling for the 4 type of sweet melon varieties in different maturity stage on different storage temperature (4 and 8 ^{o}C) for the storability measured on different way and test the change sugar content storage. The storage results of different variety shown clearly the long-shelf life varieties were Main results of our research work was the evaluation of the storage results of the melon fruits which were harvested in different maturity stage. Results of dropping-treatment, model of ill-treatment shown dramatically deterioration loss.

INTRODUCTION

In Hungary the sweet melon consumption is relatively low comparing to another European countries. Hungarian traditional melon growing based on early, normal maturity, quick over-ripening varieties, in that case the harvest time and the time of the fresh consumption from local production are short. Chance to increase the Hungarian consumption of melon are the introduction and entering on the market the new, long-shelf life (LSL) varieties(Füstös ,2005,2007.). The adopted method of the short storage and post-harvest handling is not in Hungarian trade practice. We had experiments to study the effect of the different storage temperature, different post-harvest handling for the 4 type of sweet melon varieties in different maturity stages

MATERIAL AND METHODS

We tested registered melon varieties in EU Common Catalogues. The fruits were grown in the Variety Trial Station of Central Agricultural Office in Kecskemét, Hungary.
*Cantalup type melon varieties
Fiata :short shelf life, early maturity, orange flesh, quick over-maturity
Proteo: long shelf life, early variety, orange flesh, slow over-maturity
*Galia type melon varieties
Candy: short shelf life, early maturity, white-green flesh, quick over-maturity
Solarking, long shelf life, middle or late maturity, green flesh, slow over-maturity

Melon fruits of the varieties were harvested at two maturity stages: 50 % and 75%.
We stored the fruits in experimental storage chamber without any packing on 4 ^{o}C and 8 ^{o}C, at 90-95 % relative humidity, during 28 days. We sampled the stored fruits 4 times weekly. To simulate poor handling technique some fruits were dropped from height of 50 cm 2 or 4 times for studying the effect of bruising on fruit firmness and weight loss. The treated fruits were stored and measured same than other ones.
Measurement methods were used for studying the changes in rheological parameters of fruits: weight of fruits - weight loss, skin and flesh firmness (Pankotai et al,2004, 2007) by manual penetrometer – FT 327, 0,8 mm diameter cylindrical probe, Firmness kg /mm , stiffness by acoustic method. We measured by PC with sound Card: Sound Blaster PCI512
Acoustic sensor: condenser microphone, preamplifer
Sample holder above the microphone
Software: Stiff,Measured: resonant frequence (f), Hz mass of the sample (m),g
Siffness = f 2 * m / 1 000 000 N/mm
Food-chemical parameters were detected from samples of three maturity stage: 50 % and 75%.100% : refraction (TSS) % by refractometer, sugars – glucose, fructose, sucrose by enzimatic method . The sweetness index was calculated.

RESULTS AND DISCUSSION

All varieties were less weight loss, better storage results in the lower, 4^{o}C temperature, In the chamber where the temperature was 8^{o}C after 4 weeks were no edible fruits.

The melons were harvested in earlier maturity stage got a better storage results of two Cantalup type varieties. The melons were harvested in 75% maturity stage after 4 weeks were no edible fruits.
The correlation of destructive and non-destructive measurement methods was very close.
We will present in the following the data of stiffness loss, characterized the quality of melons during storage
The melons were harvested in earlier maturity stage generally got a better storage quality instead of Solarking variety.
The sugar content of Fiata variety decreased after 3 weeks. The sugar content of Proteo variety were less changeable.
Summary the results of poor handling experiments shown the big differences among the quality of intact and bruised melons. After dropping immediately 27-48 % firmness loss were detected in fruits, the ratio increased during storage time.

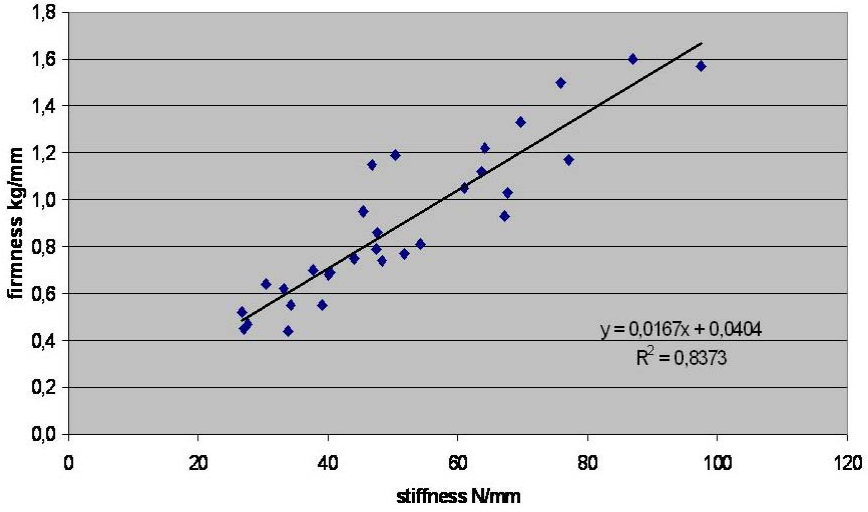

Figure 1
The correlation between the
destructive measurement by penetrometer (firmness) and
nondestructive measurement by acoustic method (stiffness)

Conclusions

The storage results of different varieties shown clearly the long-shelf life varieties and earlier maturity stage gave better storage quality.
In lower temperature (4 ^{O}C) we measured better storage results.

Results of dropping-treatment, model poor handling shown dramatically deterioration loss.

The non-destructive acoustic measurement method is suitable for control of the melon fruit quality during storage time
The sugar contents decrease in normal maturity type and stable in LSL type during storage
Our research results add some detailed information for the better storage results of the different melon variety types. We hope help to supply for longer season of our market with better quality melon product, which will increase Hungarian melon consumption

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LEARNING OF PHYSICOCHEMICAL PARAMETERS OF THE SAUSAGE GOODS

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ABSTRACT

Meat products are one of the major foods, containing majority of nutrients necessary for a man. Therefore monitoring of meat's quality and meat's products

is one of the priorities of the branch. During the done work was learned such methods as:
Moisture definitions in different breeds of sausage goods.
Definition pH of a sausage meat by the colorimetric method (tracer method).
Definition of calcium content in meat products by the chelatometry method and potentiometric titration.
During done work regularities in changes of moisture content, calcium and pH in different breeds of producers of sausage goods were made.
Calcium is contained in meat in free and bound state. For definition of contents of Ca^{2+} in meat 2 methods were used. The first method is based on previous ingition of analyze produce, receiving solution of ash and chelatometry titrating in presence of Murexid.
The second methodic is grounded on mineralization of organic substances, dissolution of mineralization in chlorine – hydrogen acid with following titrating of solution of complexon III in alkaline medium. It is an example of potentiometric titration on reaction of complex formation.
Moisture definition was made by an arbitration method.
For the aim to study of time history of physicochemical properties of sausages during storage analyze of fresh sausage and in 14 days storage of examples at the temperature of 4-6°C and a relative humidity of 85 % were carried out.
According to the received results size of pH variates slightly (increases on 0.1in examples №1and №5). Moisture content in process of storage by reason of drying decreased at the average by 14 %.

CHANGES OF THE DARK BEER RHEOLOGIC PROPERTIES DURING STORAGE

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ABSTRACT

Results from measuring of rheologic properties of dark beer are shown in this paper. Dependencies of dynamic viscosity on rotational frequency of probe are shown. Dependencies of dynamic viscosity, kinematic viscosity and fluidity on temperature and on time of storing are described. Dependencies of dynamic

viscosity on rotational frequency of probe had increasing shape. Dynamic viscosity had increased with time of storing. Dependencies of dynamic viscosity and kinematic viscosity on temperature had decreasing shape. Dynamic viscosity and kinematic viscosity had increased a bit with time of storing. Dependencies of dark beer fluidity are increasing with temperature. Fluidity of used sample had decreased a bit with time of storing. In Tab. 2 can be seen coefficients A, B, C, D of regression equations (3, 4).

Table 1
Coefficients M, N of regression equation (2), and coefficients of determination

Measurement Coefficients	First measurement	Second measurement	Third measurement
M	0.035 6	0.037 4	0.038 2
N	10.65	10.65	10.75
R^2	0.998 865	0.998 686	0.996 340

Arrhenius equation $\eta = \eta_0 e^{-\frac{E_A}{RT}}$ (1)

where η_0 is reference value of dynamic viscosity, E_A is activation energy, R is gas constant and T is temperature. This equation has decreasing exponential shape.

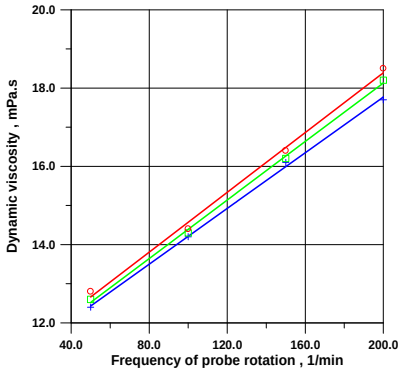

Figure 1
Dependencies of dark beer dynamic viscosity on frequency of probe rotation after different time of storing: first measurement (+), second measurement after one week of storing (□), third measurement after two weeks of storing (○).

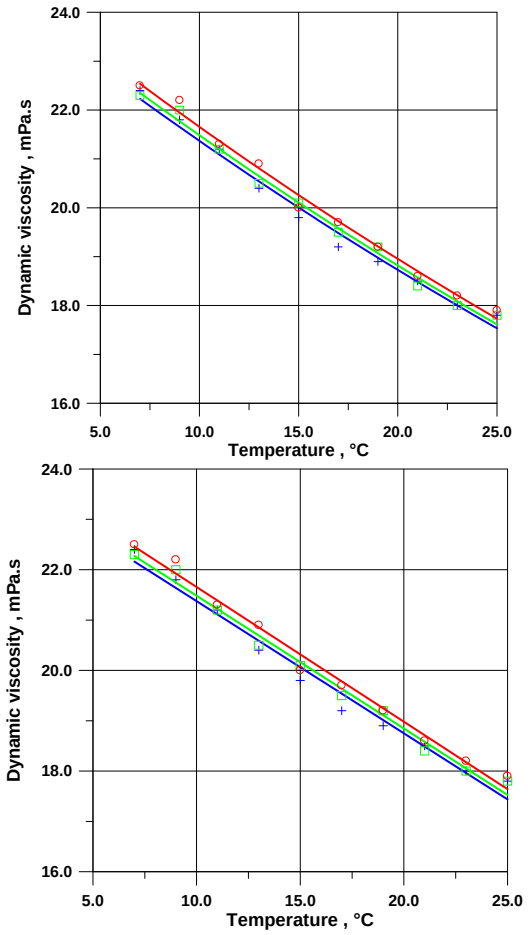

Figure 2
Dependencies of dark beer dynamic viscosity on temperature after different time of storing : first measurement (+), second measurement after one week of storing (□), third measurement after two weeks of storing (○).
(exponential function on the left side, linear function on the right side)

$$\eta = M\left(\frac{f}{f_0}\right) + N \qquad (2)$$

where f is frequency of probe rotation, f_0 = 1 min^{-1}; M, N are constants dependent on kind of material, and on ways of processing and storing.

$$\eta = A\, e^{-B\left(\frac{t}{t_0}\right)} \tag{3}$$

$$\eta = -C\left(\frac{t}{t_0}\right) + D \tag{4}$$

where t is temperature, t_0 = 1 °C; A, B, C, D are constants dependent on kind of material, and on ways of processing and storing .

Table 2
Coefficients A, B, C, D of regression equations (3, 4), and coefficients of determination

Measurement Coefficients	**First measurement**	**Second measurement**	**Third measurement**
A	24.378 4	24.522 7	24.740 3
B	0.013 183 6	0.013 237 2	0.013 322 7
R^2	0.987 173	0.992 260	0.992 312
C	0.262 424	0.263 636	0.267 576
D	23.998 8	24.118 2	24.331 2
R^2	0.980 412	0.989 489	0.988 368

SOME ELECTRICAL PROPERTIES OF DRIED QUINCES CYDONIA OBLONGA

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ABSTRACT

The electrical measurements are utilized at appraisal of various fruits quality. Samples of dried quince were delivered by Faculty of Agriculture of University in Novi Sad. The samples were dried in osmotic drier on the beginning and in convective drier after it. Electrical resistance, impedance and capacitance were measured by LCR meter Good Will LCR-821. Measurements had been realized

at frequencies from 100 Hz to 200 kHz. Frequency dependencies of electrical properties were determined for all samples. The capacitance, resistance, impedance and relative permittivity as well decrease powerly in dependence on the frequency. The differences between values of capacitance belonged to different quinces are very small. We can deduce that the method of drying ensured the same properties of all apricot pieces.

INTRODUCTION

The electrical measurements are utilized at appraisal of various fruits quality. For example Gordeev (1998) developed an apparatus for investigation the electrical parameters of fruit tissue, viz. polarization capacity and conductivity. Vozáry et al. (1999) described the impedance parameter characterized apple bruise. Mészáros et al. (2005) measured the impedance spectra of apple slices during drying and correlated impedance parameters to moisture content in the different drying periods. Electric capacity measurement was utilized for watermelon quality determination by Kato (1997). Muha et al. (2005) investigated of apricots maturity by non-destructive methods. Arnold et al. (1998) described electrical impedance methods for assessing fruit quality. Montoya et al. (1994) utilized a technique for measuring the electrical conductivity of intact fruits. They measured the electrical conductivity of avocado fruits during cold storage and ripening. The health state of some fruit can be observed on ground of their electrical properties. Than et al. (1996) investigated the effect of pineapple blackheart on electrical resistance of pulp tissues. The electrical resistance of pulp from harvested pineapples with blackheart was lower than that of tissue from healthy pineapples. Resistance decreased with increase in disease severity. The measurement of the electrical resistance thus provides a rapid and convenient method of diagnosing the blackheart. Hlaváčová and Hlaváč (2003) measured the electrical properties of apricot flesh. It was found that the decay of apricot flesh influences its electric conductivity, impedance and capacity, which are caused by damage of cell membranes. The impedance decreased on values from 250 Ω till 900 Ω for decayed apricots; on the contrary the impedance of flesh intact with decay attained the values more than 13 kΩ.

MATERIAL AND METHOD

Samples of dried quince were delivered by Faculty of Agriculture of University in Novi Sad. Quince is a fruit with hard flesh, with many pips or seeds; it has high pectin content, and a wonderful fragrance. The samples were dried in osmotic drier in sugar solution with concentration of 0.85 and temperature 45 °C

during 120 min on the beginning. Outcome moisture content wet basis was about 32 %. During the soaking in concentrated solution three mass transfer flows were taking place. One was water outflow from the tissue to the surrounding solution, the second was solute movement from the medium to the bioproduct, and the third mass transfer flow was the leaching of food solutes to the medium.

The samples were dried in convective drier after osmotic drying at temperature of 50 °C during 240 min. The method of drying is described by Babić Lj. et al. (2002). Final moisture content w. b. of quinces was about 20 %. For example these properties of dried fruits were noted: relative increase of sugar content and vitamin C content, and the taste improvement as well.
30 pieces of dried fruits were chosen and sliced on thickness of 5 mm. The dried pieces of fruits were located between 2 plates of capacitor. We measured the resistance, impedance and capacitance of samples by LCR meter Good Will 821 in the frequency range from 50 Hz to 200 kHz. The measured values were loaded by PC. Each electrical property was measured at all frequencies three times. Average value has been computed from these ones.

RESULTS AND DISCUSSION

Frequency dependencies of resistance, impedance and capacitance were constructed from measured values. For illustration, on Fig. 1 the frequency dependencies of impedance for 6 samples of dried quince are shown.

The impedance decreases powerly with frequency according to the equation

$$Z = Z_o\left(\frac{f}{f_o}\right)^{-k} \qquad (1)$$

where: Z – impedance, Z_o – reference impedance, f – frequency, f_o = 1 kHz, k – constant.

The coefficients of determination of this equation have high value for all samples. The frequency dependencies of resistance and impedance have the same shape and differences are negligible. It is evident that in this frequency range the reactances of quince haven't influence on their impedance.The frequency dependencies of capacitance for 6 samples of dried quince were studied, as well. The regression equation of these dependencies has the same shape as equation (1)

$$C = C_o\left(\frac{f}{f_o}\right)^{-k} \qquad (2)$$

where: C – capacitance, C_o – reference capacitance, f – frequency, f_o = 1 kHz, k – constant.

The coefficients of determination have high value for all samples in this case, as well. The displacement between frequency dependencies of capacitance for 6 samples is very small. Average relative permittivity calculated on the base of the capacitance and dimensions of samples has value about 12.

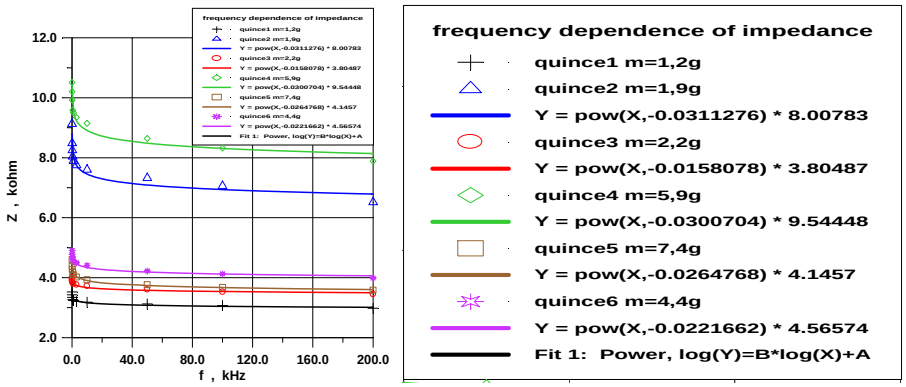

Figure 1
Frequency dependencies of impedance
for 6 samples of dried quince

Conclusion

The resistance, impedance and capacitance decrease with frequency. The regression equation has the shape of decreasing power function as (1), (2). These equations have high coefficients of determination. The differences between dependencies for resistance and impedance are negligible. It is evident that in this frequency range the reactance of quinces hasn't influence on their impedance. The displacement between frequency dependencies of capacitance is very small. From this we can dedicate that the method of drying ensured the same properties of all quince pieces. Electrical properties can be used at the control of quince pieces identical moisture content after drying.

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PHYSICAL QUALITY OF POTATO VARIETIES (SOLANUM TUBEROSUM L.)

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ABSTRACT

Ten potato varieties were studied for firmness of raw tubers and texture of the boiled product. Textural properties of selected varieties of potatoes were evaluated using unaxial compression test on a device Tira test 27025. Cylindrical specimens of the exact size were prepared from raw and boiled potatoes. The force needed for compression was recorded and assessed.

In raw potatoes the varieties with the biggest hardness was variety Red Anna (201,2 N), Keřkovské rohlíčky (186,5 N) or Korela (186,2 N). The variety Jitka needed only the force of 133,5 N to be compressed.
The most hard boiled potatoes was the varieties Rosara (12,0 N) and Ditta (11,3 N). Both of them are classed to cooking type AB. Minimal force for compression needed the variety Katka (3,8 N) which is cooking type BC. According to the results of the tests there is evident relation between the cooking type and hardness of boiled potatoes. It is valuable and could help us to observe some planting conditions, like physiological maturity in relation of potato quality for consumers.

INTRODUCTION

Texture of potatoes is qualitatively and economically important factor. According to the texture of boiled tuber are potatoes divided into various cooking types such as salads (A), multi-purpose (B) or floury (C), including transitional groups. It is based on disintegration, consistency, mealiness, dryness and structure. These are determined particularly by the starch content. Human perception of the texture may be imitated by instrumental methods in several forms such as chewing or biting. Now, there are identified some differentials in texture parameter during potato storage. Some varieties through the storage have different cooking type at the storage opening distinct of ending (SOLOMON, JINDAL, 2007). These used methods are accurate, repeatable and representative. It is also possible to investigate the relationship between the texture of raw and cooked potatoes.

MATERIAL AND METHOD

Potatoes *Solanum tuberosum L*. of the varieties Aneta, Ditta, Jitka, Karin, Katka, Keřkovské rohlíčky, Korela, Lolita, Red Anne and Rosara were used as the experimental material. The crop was from the School Farm in Žabčice which was harvested in September 2007. These varieties were including various cooking types of the potatoes ranging from the A to B and C type commonly used in Czech gastronomy. The tubers were stored under controlled conditions before the analysis. For testing the medium size tuber were used.
The laboratory device Tira test 27025 was used for evaluating the texture of potatoes. Cylindrical samples were prepared from raw tubers from the medium part of the tuber and not from the vascular ring using cork borer no.12 (diameter 12 mm, height 10 mm).

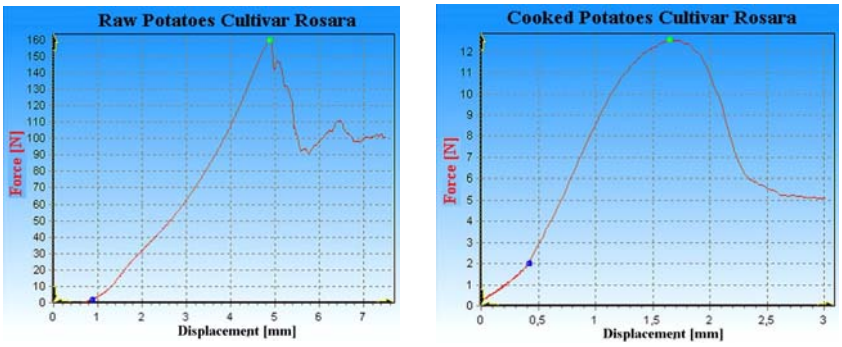

Figure 1
Force/displacement curves recorded
during Rosara specimen unaxial compression test

Raw samples were cooked in the distilled water for a period of 7 minutes. There were 50 specimens in the series. For evaluating of the texture was used uniaxial compression test. Raw samples was compressed between two steel plates to 75 % of its original height, cooked one to 30 %. The loading rate was 50 mm per minute. The dependance of the force on the time of compression was recorded (Fig.1). The hardness of the tubers of different varieties was compared and statistically evaluated (Unistat 5.1).

RESULTS

The classification by varieties was significant factor influencing the force needed for compression of the sample. There were statistically significantly differences of the hardness between potato varieties. In raw potatoes the varieties with the biggest hardness was variety Red Anna, Keřkovské rohlíčky or Korela. The variety Jitka needed only the force of 133,5 N to be compressed.
The most hard boiled potatoes was the varieties Rosara and Ditta. Both of them are classed to cooking type AB. Minimal force for compression needed the variety Katka, which is cooking type BC. Generally there was no dependance of raw potato texture on the cooking type. But concerning cooked potatoes hardness it was found that less hard are cooking type BC and B while for cooking type AB force increased.

DISCUSSION AND CONCLUSION

Potato tuber is heterogeneous material and specimens varied a lot. The variation is larger for cooked samples than for raw potatoes, according to THYBO, VAN DEN BERG (2002). The findings of this study illustrate obvious differences between textural properties of potato varieties. It is not only the variety what is the important influence. For example it was investigated by NUNN et al. (2006) that some vegetables had different values of texture score depending on type of boiling. Important influences are also the soil, a fertilizers or weather condition. But only with real values we can compare sufficiently different groups of specimens under various conditions (SOLOMON, JINDAL, 2007). Next our research will concentrate on these external influences on the texture of the potatoes. Our aim is to create useful database which would characterize each potato variety by texture and other analyses.

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NON-DESTRUCTIVE SORTING OF POTATOES

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ABSTRACT

The internal quality of potatoes and other vegetables and fruits is an important quality factor for both consumers and food industry. There are several diseases and defects, which have no effect to the quality of potato skin. Therefore internal defects remain invisible to human and also to ordinary camera.

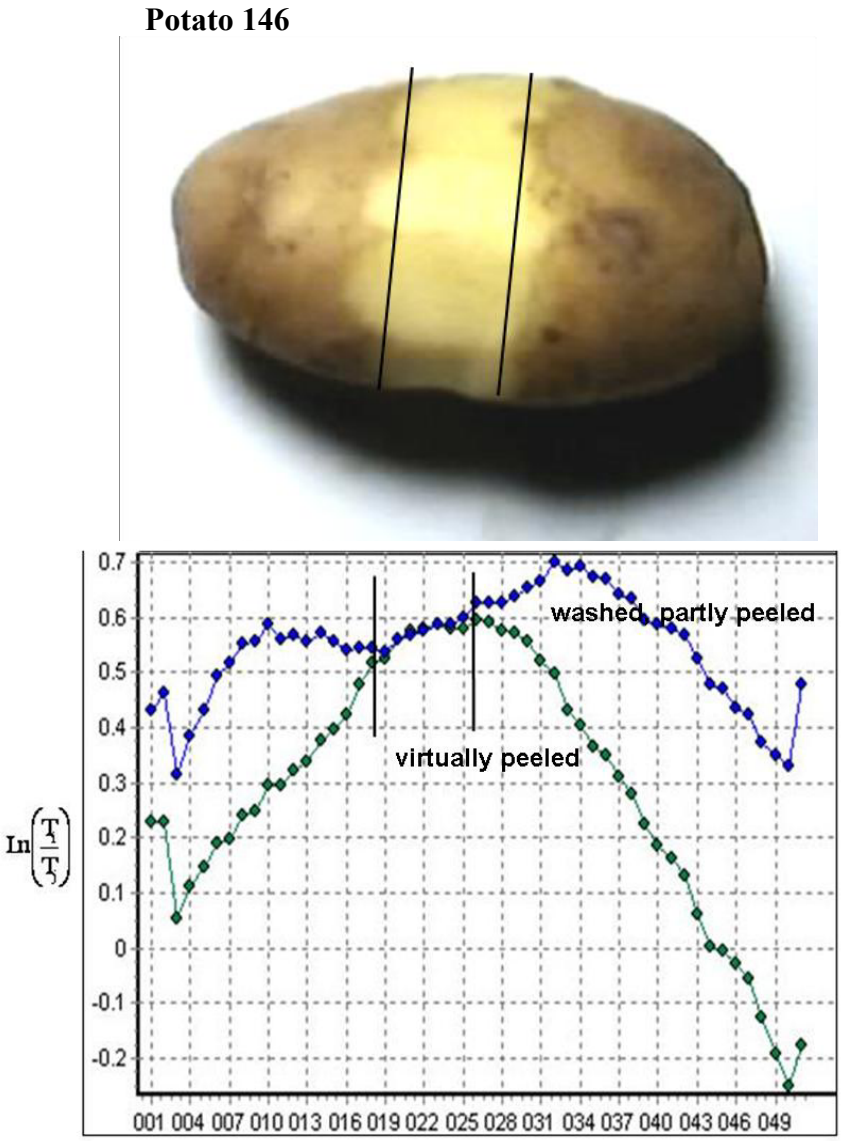

Figure 1.
Partly peeled potato tuber

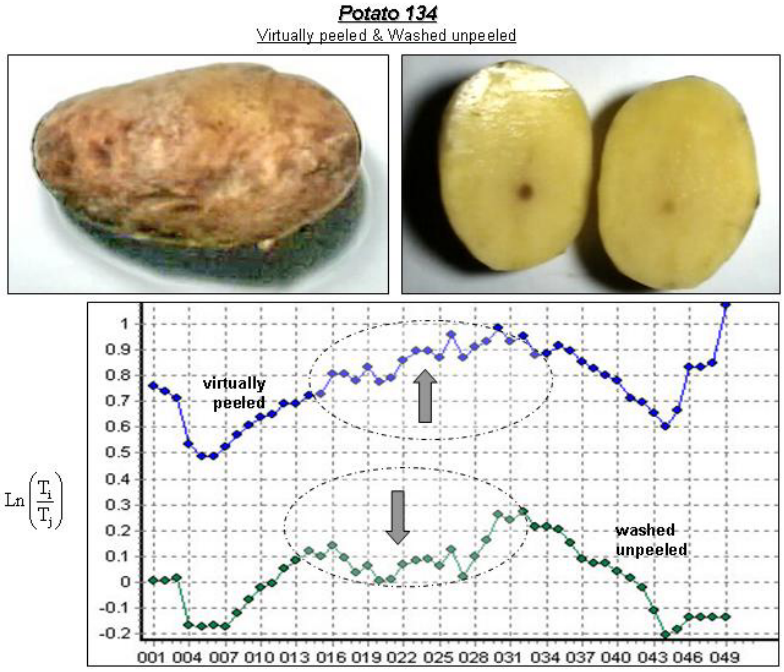

Figure 2.
The strongly defective peel masks the small internal defect.

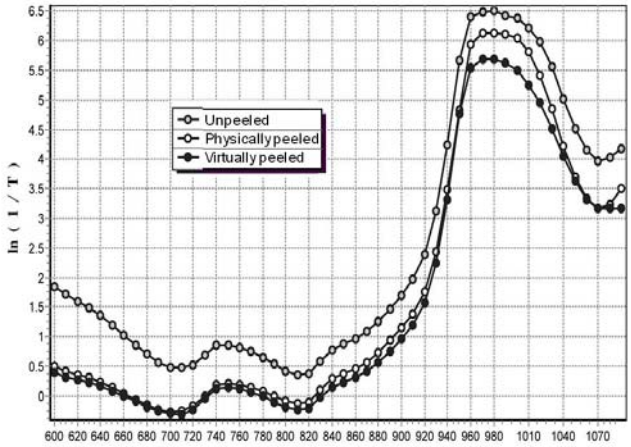

Figure 3.
Transmittance spectra of unpeeled, physically and virtually peeled potato tuber (variety BINTJE) with a skin injured by scab (Sample 257)

V at V-camera stands for "virtually peeling". In this method and technology the potato, or other skinned fruit or vegetable, is virtually peeled by measuring the NIR transmission of potatoes and simultaneously measuring the NIR reflection from the potato skin.

NON - DESTRUCTIVE PHOTOSYNTHETIC DETERMINATION OF BEAN PLANTS (PHASEOLUS VULGARIS L.) RESPONSE TO SALT STRESS

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Table 1
Parameters of chlorophyll fluorescence in dark adapted leaves of control and salt stressed bean plants. (* P<0.5; ** P<0.1;)

		Fo	**Fm**
cv. Lody	Control	549±24	2115±47
	NaCl	623±21** (123)	1720±58 (81)
	Na_2SO_4	715±31** (130)	1620±66 * (76)
cv. Gina	Control	577±25	2185±51
	NaCl	625±19 (108)	1813±47 (82)
	Na_2SO_4	690±21* (119)	1618±62**(77)
cv. Tara	Control	560±28	2080±22
	NaCl	585±22 (105)	1872±48 (90)
	Na_2SO_4	620±19 (111)	1830±31 (88)
		Fv	**Fv/Fm**
cv. Lody	Control	1566±48	0.740±0.028
	NaCl	1117±29* (65)	0.0.645±0.031 (87)
	Na_2SO_4	975±51** (62)	0.601±0.030 (81)
cv. Gina	Control	1608±44	0.735±0.029
	NaCl	1188±22* (72)	0.655±0.032 (89)
	Na_2SO_4	992±51** (64)	0.589±0.019* (80)
cv. Tara	Control	1525±71	0.733±0.033
	NaCl	1287±44* (84)	0.687±0.040 (93)
	Na_2SO_4	1210±61 *(79)	0.661±0.037 (90)

Table 2
Parameters of chlorophyll fluorescence in light adapted leaves of control and salt stressed bean plants. (* P<0.5; ** P<0.1; *** P<0.01).

		Y	qP
cv. Lody	Control	0.508±0.022	0.650±0.031
	NaCl	0.279±0.018** (55)	0.390±0.029 (60)
	Na_2SO_4	0.254±0.031** (50)	0.357±0.022**(50)
cv. Gina	Control	0.539±0.022	0.620±0.041
	NaCl	0.300±0.028** (56)	0.446±0.029 *(72)
	Na_2SO_4	0.258±0.033***(48)	0.421±0.021**(68)
cv. Tara	Control	0.489±0.025	0.635±0.044
	NaCl	0.332±0.021* (68)	0.539±0.022 (85)
	Na_2SO_4	0.293±0.019**(60)	0.476±0.028 **(75)
		qN	**ETR**
cv. Lody	Control	0.450±0.023	124.9±6.8
	NaCl	0.540±0.017* (120)	68.6±4.4**(55)
	Na_2SO_4	0.585±0.021**(130)	62.5±5.9**(50)
cv. Gina	Control	0.548±0.027	132.5±5.5
	NaCl	0.685±0.019* (125)	73.8±6.1 * (55)
	Na_2SO_4	0.723±0.011** (132)	63.5±4.4**(48)
cv. Tara	Control	0.575±0.021	120.0±4.8
	NaCl	0.661±0.028 (115)	81.9±4.2* (67)
	Na_2SO_4	0.678±0.033* (118)	72.0±5.0* (61)

Using of non-destructive methods of chlorophyll fluorescence characteristics of photo system II (PSII) to determine the beginning of the salt stress in plants, were studied. The bean plants (cultivars Lody, Gina and Tara) were grown in pots as hydroponics cultures in a half-strength Hoagland nutrient solution. The plants were treated for 7 days with NaCl and Na_2SO_4 (concentration of 100 mM). It was found that salt stress increases initial (F_0) fluorescence and decreases maximal (F_m), and variable (F_v) fluorescence, as well as F_v/F_m parameter in dark adapted leaves. In light adapted leaves a significant decrease in quantum yield (Y), photochemical quenching (qP) and electron transport rate (ETR) of PSII was occurred. In conclusion, it is considered that cv. Tara is more tolerant and cv. Lody is more sensitive to salt stress. The applied Na_2SO_4 caused stronger inhibition for all cultivars than those treated with NaCl .

CULTIVAR DIFFERENCES IN CD, ZN AND PB ACCUMULATION AND PRODUCTIVITY OF DURUM WHEAT PLANTS GROWN IN METAL CONTAMINATED SOILS

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ABSTRACT

A pot experiment has been conducted in "Poushkarov" Institute of Soil Science during 2007 to study the effects of metal contaminated soil on Cd, Zn and Pb plant accumulation, plant performance and grain productivity of three durum wheat cultivars. The contaminated soil was taken from the vicinity of the non-ferrous metal producing smelter near Plovdiv, while the control, noncontaminated soil having similar physical-chemical properties - from the experimental field of the Agricultural University of Plovdiv. Plant samples were taken and measured for heavy metal content in root, leaf, stem and grain during the vegetation period. Both chlorophyll content and leaf gas exchange parameters were determined in the flag leaf at the stage of grain filling. The grain productivity was established at harvest. The results showed that the wheat plants from all cultivars grew weaker in metal contaminated soil than the respective controls during the whole vegetation period. This corresponded to their decreased net photosynthetic rate, final shoot dry biomass accumulation as well as lower grain productivity. Grain Cd content was over the permissible limits in all durum wheat cultivars.

Table 1
Heavy metal content in plant organs of durum wheat cultivars grown in metal contaminated soil

Treatments		Heavy metal content in plant organs (mg kg^{-1} dry mass)		
Cultivars	Soil status	Heavy metal	Roots	Leaf
Vazhod	noncontaminated (control)	Cd	0.37	0.23
		Zn	46.0	19.6
		Pb	3.7	6.0
	contaminated	Cd	15.3	4.5
		Zn	305.0	171.5
		Pb	26.7	9.9
Yavor	noncontaminated (control)	Cd	0.36	0.20
		Zn	83.2	18.2
		Pb	3.9	5.8
	contaminated	Cd	12.4	5.3
		Zn	326.1	229.2
		Pb	22.4	9.27
Saturn 1	noncontaminated (control)	Cd	0.40	0.27
		Zn	73.3	27.3
		Pb	3.7	6.6
	contaminated	Cd	15.5	5.05
		Zn	338.0	242.1
		Pb	23.8	11.6
Cultivars	Soil status	Heavy metal	Stem	Grain
Vazhod	noncontaminated (control)	Cd	0.22	0.09
		Zn	7.7	21.9
		Pb	3.3	1.9
	contaminated	Cd	3.8	1.39
		Zn	308.2	64.5
		Pb	6.6	3.4
Yavor	noncontaminated (control)	Cd	0.18	0.07
		Zn	7.3	40.8
		Pb	3.3	0.9
	contaminated	Cd	3.5	2.21
		Zn	396.1	76.5
		Pb	5.9	1.5
Saturn 1	noncontaminated (control)	Cd	0.26	0.11
		Zn	4.0	38.7
		Pb	9.7	1.3
	contaminated	Cd	5.6	1.72
		Zn	308.3	61.5
		Pb	7.2	1.5

INFLUENCE OF DIFFERENT INCUBATION TEMPERATURES ON GRAININESS AND ROUGHNESS OF STIRRED YOGHURT

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ABSTRACT

The aim of this work was to study how the incubation temperature and the storage time can affect the physicochemical characteristics, including graininess and roughness, of stirred yoghurt. Yoghurts were incubated at 37, 42 or 45°C. Physicochemical properties of stirred yoghurt were determined during storage at 4°C for 15 days. Visual roughness, number of grains, perimeter of grains, syneresis, storage modulus, and yield stress decreased, when the incubation temperature was decreased. The storage time did not affect any of the physicochemical properties of yoghurt, except for the pH. For practical applications, incubation temperature can be optimized to improve quality or modified to create fermented milk products with different physical properties.

INTRODUCTION

Yoghurt represents a very significant dairy product around the world (Chandan, 2006). Although there is great interest in the healthy-promoting properties of yoghurt, texture of stirred yoghurt plays an important quality and consumer acceptance (Lee & Lucey, 2004; Lucey, 2004). Texture, one of the most essential components of the stirred yoghurt quality, represents all the rheological and structural attributes perceptible by means of mechanical, tactile and visual receptors (Sodini et al., 2004).

Textural defects of stirred yoghurt like graininess and roughness are objectionable as consumers expect smooth, uniform and fine-bodied products (Lucey et al., 1998). Graininess which sometimes occurs during the manufacture of stirred yoghurt is the appearance of non-dispersible particles (Tamime & Robinson, 1999). Roughness, irregular conformation of the surface structure of food, is an important physical property of solid food influencing sensory attributes (Pedreschi & Aguilera, 2000). The use of a high incubation temperature is often associated with these types of defects (Lucey & Singh, 1998; Lucey, 2004). Sodini et al. (2004) reported that the graininess of stirred yoghurt decreased, when yoghurt milk was incubated at 38°C instead of at 42°C.

The objective of this research was to study the effect of incubation temperature on the physicochemical properties, including graininess and roughness, of stirred yoghurt.

MATERIAL AND METHODS

1. Milk processing and yoghurt preparation

Skim milk [13% (w/w) total solids] was prepared with low-heat skim milk powder [36.1% (w/w) total protein, BY 409 EG, Bayerische Milchindustrie eG, Landshut, Germany] dissolved in distilled water. The milk was left to hydrate for 2 h at ambient temperature while being continuously stirred. The standardized milk was heated at 95°C for 5 min and, then, subsequently cooled to 37, 42 or 45°C in the tubular heating equipment (200 L h^{-1}) of the Dairy for Research and Training Department at the University of Hohenheim (ASEPTO-Therm UHT-Pilotanlage, Asepto GmbH, Dinkelscherben, Germany). After cooling, 0.1 g L^{-1} of frozen pellets (starter culture Yo-Mix 621, Danisco A/S, Denmark) was added, and the yoghurt milk was incubated at 37, 42 or 45°C until the pH had decreased to 4.60. Fermentation was stopped by rapidly cooling to 4°C in an ice-water bath. At the beginning of the cooling in an ice-water bath the yoghurt was manually stirred with a stainless-steel bored disk by up and down movements for almost 60 s. After setting the stirred product into 100 mL cups, the stirred yoghurt samples were stored at 4°C for 15 days. The physicochemical characteristics of the samples were analysed at days 1, and 15 of storage.

2. Physicochemical property measurements

2.1. pH and syneresis

The pH was determined by a Knick 765 pH meter (Knick Elektronische Messgeräte GmbH & Co., Germany), and syneresis of the yoghurt samples was measured using centrifugation method (Bhullar, Uddin & Shah, 2002).

2.2. Graininess and visual roughness

Graininess was measured by image analysis using the protocol described by Kücükcetin (2008). Image analysis was performed to determine the number of grains and boundary length (perimeter) of the grains as a measure for graininess. The number of grains indicating a perimeter greater than 1.0 mm per 3 ml of yoghurt and the mean perimeter of grains (PG) were evaluated. The mean absolute intensity deviation of each pixel from a median smoothed intensity of

the picture was defined as visual roughness (R_{vis}) of the yoghurt sample. The measurement of R_{vis} was based on that described by Kücükcetin (2008).

2.3. Texture measurement

The textural properties of the samples were analyzed after 1-day and 14-day storage. Storage modulus (G') and yield stress were determined according to Baravian et al. (2002) and Steffe (1996), respectively.

3. Statistical evaluation

All statistical calculations were performed using SAS Statistical Software (release for Windows, SAS Institute Inc., USA).

RESULTS AND DISCUSSION

The pH at the end of the incubation period was similar for the different yoghurts with an average pH of 4.6, regardless of the incubation temperature. The pH values had decreased significantly (p<0.05) in each of the yoghurt samples after having been stored at 4°C for 15 days.

. At day 1, average syneresis of the yoghurt samples incubated at 45, 42 and 37°C was measured to be 76.2±0.9, 73.9±0.8 and 71.0±225%, respectively. Syneresis in yoghurt samples decreased as the incubation temperature decreased, which is in agreement with previous studies. Lucey, Munro, and Singh (1998) and Lee and Lucey (2004) reported that yoghurt produced at a lower incubation temperature showed lower syneresis.

The number of grains and the mean perimeter of grains of the day 1 yoghurt varied from 21 to 183 per 3 mL of the sample and from 2.1 to 3.4 mm, respectively, according to the incubation temperature. The number of grains in the yoghurt incubated at 45°C was higher than that of the yoghurt incubated at 37 or 42°C. The use of high incubation temperatures in cultured products promotes the formation of grains (Lucey, 2004). At a low fermentation temperature, the aggregation of proteins occurs more slowly, and a large number of protein-protein interactions between the casein particles takes place. Thereby, less rearrangement of the particles during gel formation occurs. This forces the formation of a more continuous network and contributes to an increase in the rigidity of the network. This may also explain why products obtained at low temperatures are smoother, as a lower extent of particle rearrangement would imply less graininess (Sodini et al., 2004). The visual roughness was influenced by the incubation temperature. The effect of storage was not significant (P>0.05). The visual roughness decreased significantly (p<0.05) as the incubation temperature was decreased.

The G' and the yield stress of the yoghurt varied from about 225 to 406 Pa and from 32 to about 69 Pa, respectively, according to the technological conditions. The G' values of the samples increased significantly (p<0.05) with incubation temperature; a similar trend was reported by Lankes, Ozer, and Robinson (1998), who showed that the number and distribution of the strong bonds increased with incubation temperature. These authors assumed that the stronger protein bonds contributed to the elastic character of viscoelastic gels. The yield stress of yoghurt samples incubated at 37°C was lower than those incubated at 42 or 45°C. The yield stress significantly (p<0.05) decreased as the incubation temperature decreased.

Conclusions

This study has shown that incubation temperature affects the physicochemical properties of stirred yoghurt. As the incubation temperature was decreased, the number of grains, perimeter of grains, visual roughness, syneresis, G' and yield stress decreased. For practical applications, incubation temperature can be optimized to improve quality or modified to create fermented milk products with different physicochemical properties.

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COMPARISON OF DIFFERENT SEA BUCKTHORN BERRY VARIETIES ON THE BASIS OF PHYSICAL PROPERTIES

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ABSTRACT

Sea buckthorn (*Hippophae rhamnoides* L., *Elaeagnaceae*) as an edible berry has a long history of application as a food both in Asia and in Europe.
To describe the berries for different kind of purposes (transportation, processing) some chemical and physical analyses (the moisture content, dimensions and size distribution of the berries and also puncture resistance) were carried out.

INTRODUCTION

Sea buckthorn is a bush with berries from yellow to red in colour which has been used for centuries. These berries contain a large variety of substances especially those that are biologically active and have antioxidant properties.
In ancient Greece, sea buckthorn leaves added to horse fodder were well reputed to result in weight gain and shiny hair; thus, the Latin name "*Hippophae*" meaning shining horse.
Sea buckthorn occurs as a native plant distributed widely throughout temperate zones between 27° and 69° N latitude and 7° W and 122° E longitude including China, Mongolia, Russia, Great Britain, France, Denmark, Netherlands, Germany, Poland, Finland, Sweden, and Norway (Li and Schroeder, 1996).
During the last 10 years the cultivation of sea buckthorn in Estonia is turned more popular – there is over 500 ha sea buckthorn plantations. There are two research institutions in Estonia – the Experimental Station at Rõhu (experiments with sea buckthorn since 1998) and Polli Horticultural Research

Centre in Estonian University of Life Sciences – who study the different growing conditions and crop yield. Mostly are growing in Estonia the sea buckthorn varieties, which are developed under leading professor Trofimov in institute near the Botanic Garden of Moscow University.
The study on physical properties, such as size, weight and crushing strength of berries are required for the development of the grading system for berries.
The objective of this work was to give an overview and to compare different sea buckthorn varieties on the assumption of their physical characteristics in years 2005-2007.

MATERIALS AND METHODS

Sea buckthorn berries were harvested in seasons 2005, 2006 and 2007 from different cultivars grown in Estonia. The varieties with Russian origin were marked as AVR – Avgustinka, BOA – Botanicheskaja Aromatnaja, BOL – Botanicheskaja Ljubitelskaja, BOR – Botanicheskaja, HPR – Gibrid Pertchika, OTR – Otradnaja, PSR – Podarok Sadu, TRR - Trofimovskaja, VOR – Vorobjevskaja; and varieties with German origin were marked as ASK – Askola, DOR – Dorana, HER – Hergo and SIR – Sirola.

The moisture content was characterized using halogen moisture analyser HR83 (Mettler Toledo, Switzerland).
The geometric mean diameter (D_g) and the degree of sphericity (□) of the fruits were calculated according to Mohsenin (1970).
The mass of the berries was weighed by a chemical balance AB204 (Mettler Toledo, Switzerland).
The puncture resistance of sea buckthorn berries was characterized using a texture analyzer TA-XT2i (Stable Micro Systems, UK).
Some chemical analyses were also carried out. All the chemical and physical experiments were described by Lõugas (2006).

RESULTS AND DISCUSSION

The experiments were carried out with 13 sea buckthorn berry varieties, but unfortunately not with all varieties in all years. The first crop from German varieties was obtained in 2006, next year two varieties failed according to hard winter. And also some Russian varieties were not covered for all the years.
The moisture content was measured in all species of sea buckthorn berries. The values for Russian varieties were in the range of 81.3-85.8 %, 79.7-83.0 % and 81.3-87.3 % in 2005, 2006 and 2007, respectively; 79.5-82.0 % and 81.0-82.4 % in 2006 and 2007, respectively for German varieties.

Three principal dimensions, namely length, width and thickness, were measured using a micrometer. For Russian varieties the length of the berries was between 10.64-13.71 mm in 2005, 10.74-13.34 mm in 2006 and 9.88-12.46 mm in 2007; and the width of the berries was in the range of 7.79-9.03 mm in 2005, 8.10-9.70 mm in 2006 and 7.74-9.38 mm in 2007. The smallest berries belonged to variety PSR. For German varieties the length of the berries was 9.31-10.72 mm in 2006 and 8.45-10.51 mm in 2007; and the width of the berries was in the range of 6.45-8.44 mm in 2006 and 6.53-7.80 mm in 2007. The smallest and the biggest berries were in variety HER and SIR, respectively.

According to the formulas (Mohsenin, 1970) were calculated geometric mean diameter (Dg) and sphericity (Φ). With these parameters it is possible to evaluate the shape of the berries. It could be pointed out, that the berries with German origin were smaller than the berries with Russian origin.

Most spherical berries for Russian varieties in 2005 were in AVR variety; simultaneously most oval berries were in variety BOL, in 2006 also BOR and TRR and in 2007 BOR and BOL, respectively. The sphericity for two German varieties (HER and SIR) is quite average, but the rest are oval berries.

In 2005 the mass of the berries is between 0.49-0.85 g, in 2006 0.42-0.77 g and in 2007 0.49-0.73 g. The German varieties had lower values of mass – for ASK, DOR and HER 0.23-0.30 g and for SIR 0.46-0.48 g, respectively.

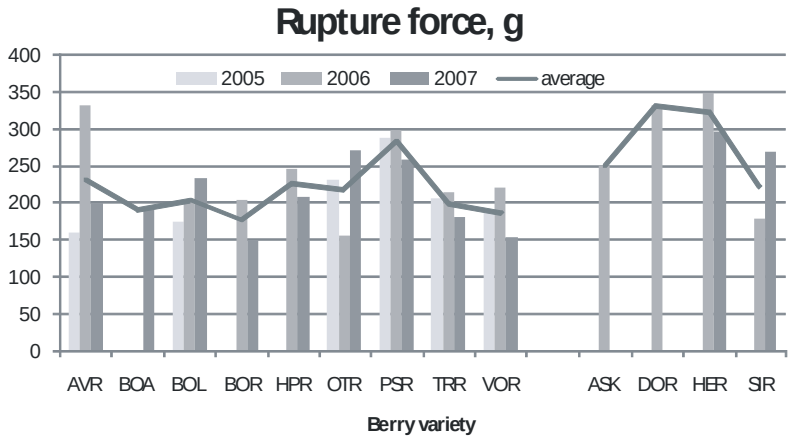

Figure 1.
The rupture force of the berries

The rupture force of sea buckthorn berry varieties is shown in Figure 1. Previous studies have been shown that the puncture resistance of the berries is influenced by freezing and defrosting (Lõugas, 2006). As all the characteristics of the berries are influenced by climatic and other conditions, we can see that the

puncture resistance is not the exception. The summer 2006 was sunny and warm – the moisture content of the berries was little bit lower compared to other years, and the rupture force had due to that higher values. And also could be pointed out that smaller berries (PSR and German varieties) had higher rupture force.
Physical properties of berries vary with the species and in some extension also with years. As a result of present work we could not point out considerable differences between berry varieties – there were some tendencies, but it was not enough to make final conclusions. More experiments are needed for variety selection.
Among some chemical analyses we have been determined the content of vitamin C, β-carotene, reducing sugars, titratable acidity. Also all these values varied among the varieties and years.

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RHEOLOGICAL MEASUREMENTS FOR STANDARDIZATION OF VISCOSITY OF TEST BOLUS AND FOODS FOR PATIENTS SUFFERING FROM DYSPHAGIA

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ABSTRACT

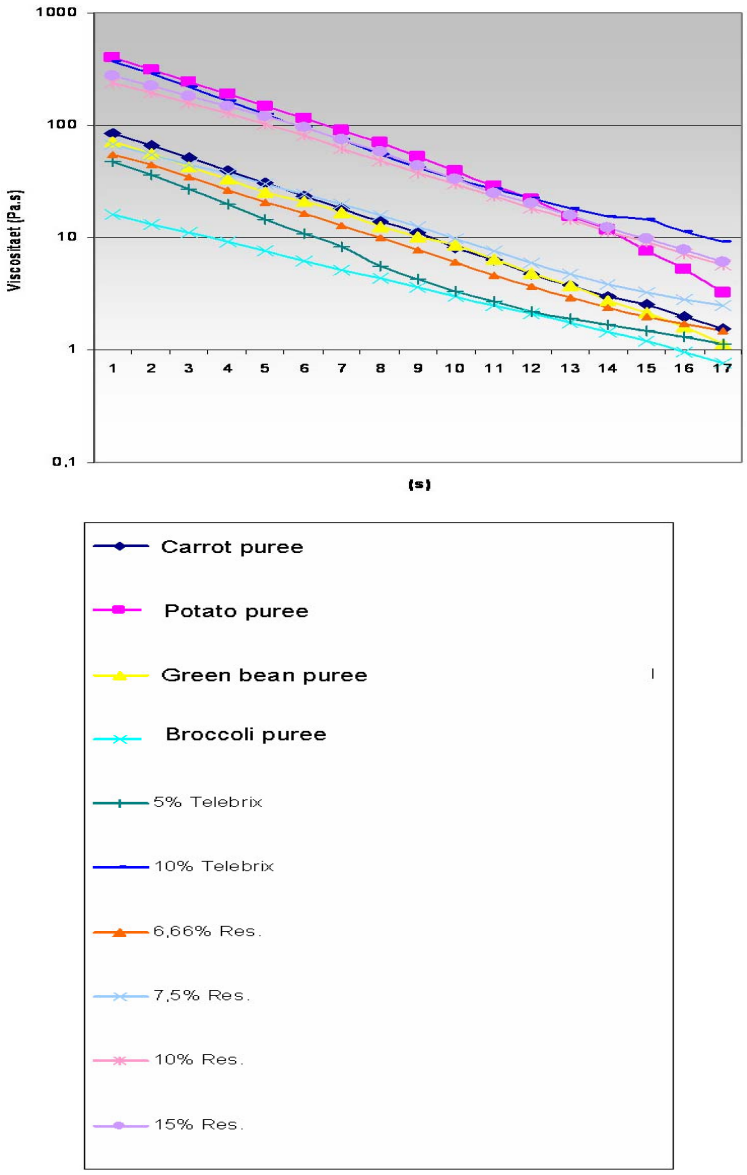

Figure 1
Rheograms (flow curves) of test food (6.6 g/ 100cm^3 -15 g/ 100cm^3),
contrast medium (5 g/ 100cm^3-10 g/ 100cm^{3}s Telebrix)
and vegetable puree (carrot, potato, green bean, broccoli)

Table 1
Comparison of the test foods and real foods (1a) and contrast medium and real foods (1b) on the basis of their viscosity
1a

Test food % **Test food g/** 100cm^3 (20°C)	**Foods**
3.3 g/ 100cm^3	peach puree(40°C)
	Danone® kephir warm(40°C)
	Danone® kephir cold(20°C)
5 g/ 100 cm^3	broccoli puree, warm and cold(40°C and 20°C)
	fruit jelly warm Dini(40°C)
6.6 g/ 100cm^3	vegetable soup(40°C)
	green pea puree(40°C)
	peach jelly(20°C)
	Danette® pudding cold(20°C)
7.5 g/ 100cm^3	carrot puree (40°C), cold vanilla pudding(20°C)
10 g/100 cm^3	potato flakes+water+Nutridrink®+broccoli püre(40°C)
15 g/ 100cm^3	potato flakes+water(40°C)
	potato flakes+water+Nutridrink®(40°C)
	potato flakes+milk(40°C)
20 g/ 100cm^3	corn mush(40°C)
	potato purée+water(40°C)
	potato purée+milk(40°C)

1b

Contrast medium and Resource® g/ cm^3(20°C)	**Foods**
10 g/100 cm^3 Telebrix®	potato purée(40°C)
5 g/100 cm^3 Telebrix®	Danette® vanilla pudding warm, (40°C)Resource® 6,6 g/ 100cm^3 (20°C)

Dysphagia is defined as difficulty in swallowing of food and liquids, caused by abnormalities of function of muscles and nerves as well as by damage of structures of the oral cavity, pharynx, larynx and oesophagus. Patients suffering from dysphagia often are unable to swallow food or liquids of certain

physical/rheological properties. Viscosity is a fundamental rheological property both of the foods used for feeding, and the for test foods applied in endoscopic and X-ray swallowing studies. The aim of this study was to determine the viscosities of the test foods as well as those of foods used for feeding in order to compare and standardize them. We prepared an increasingly concentrated series of the test foods (jelly, pudding, puree, mush) by adding thickening substance (Resource Thicken Up® (Novartis) made of cornstarch) to water, and then determined the viscosities. We also measured the viscosities of commercially available foods, self-prepared foods of different thickness, and foods with known formulas. From these results we could identify the food formula that corresponded to the test bolus that could be swallowed by the patient without aspiration in the course of a video-endoscopic or X-ray swallowing study. The measurements were taken with a dynamic shear rheometer (UDS200).

ADVANCE METHODOLOGY FOR CONTROL OF CHEMICAL CONTAMINANTS IN FOOD

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In order to ensure the safety of food, it is necessary to consider all aspects of the food chain from the primary production through the harvesting and storage to the processing and sales and supply of food to the consumer. The main contemporary tendencies in fast screening of food contaminants and residues are discussed. The main steps of laboratory analysis are mentioned. Besides laboratory available methods for precise and relevant analysis, some practical approaches are presented for early detection of contaminants as immunoassay in different formats. Their advantages and disadvantages comparing to the traditional instrumental methods are outlined.

Sources of chemical contamination of plant foodstuffs

Food is an essential ingredient to life, and access to food is often limiting factor in the size of a given population. Many substances are used to grow the quantity and quality of food needed the human population. Many of the agrochemicals are pesticides (e.g. herbicides, insecticides, fungicides, acaricides, fumigants) that may appear as residues in the food. Other type of agrochemicals that may appear as residues in animal-derived foods are veterinary drugs (e.g. antibiotics, growth promotants, and hormones). Different types of environmental

contaminants (e.g. polyhalogenated hydrocarbons, polycyclic aromatic hydrocarbons, organometallics) can appear in food through their unintentional exposure to the food through air, soil, or water. Food may also be contaminated by toxins from various microorganisms, such as bacteria or fungi (e.g. mycotoxins) or natural toxins already present in the food or that arise from spoilage. Packing components (e.g. styrenes, phthalates) can also leach into food unintentionally. In addition, chemical preservatives and synthetic antioxidants may be added after harvest or during processing of the food to extend storage time or shelf-life of food products. Other chemical additives (such as dyes, emulsifiers, sweeteners, synthetic flavor compounds, and taste enhancer) may be added to the food to make it appear better to the consumer or to alter its taste or texture.

Main aspects of analysis of chemical contaminants

Sample preparation for analysis of chemical contaminants in foodstuffs and foods consists of homogenization, extraction and clean up steps. Homogenization of sample is extremely important in some cases when contaminant is unequal distributed. A common example is mycotoxin analysis due to irregular distribution of fungi infection on the crops. This special feature requires strictly homogenization of high amount of sample and analysis of random portion of it.

The extraction procedure consists of separation of the analytes from the matrix and presentation of the material in a form that can be easily analyzed. The type of extraction step that is used for a particular matrix depends on the nature of the matrix and analytes. In some cases it is possible to extract many analytes by one solvent or solvent mixture (e.g. pesticides, phthalates), but in another case it is necessary to apply different extraction systems for analytes, because if their different structure and behavior (e.g. mycotoxins).

Currently, the common analytical approaches used for detection of chemicals in foods involve gas or liquid chromatography coupled to selective detectors (Hu et al., 2004; Stajnbaher D. et al., 2003). Due to co-extraction of many matrix components which lead to overlapping or masking of signal for analytes, matrix-matched standards should be used and confirmation of positive results is needed for official control purposes.

Nowadays, analytical methods in control laboratories are multi-class, multiresidue methods in order to detect a great number and wide range of contaminants (Anastassiades et al., 2003). In case of veterinary drugs, multiresidue methods are lacking and it is not unusual for single-methods to be used in monitoring programs. Many of common methods are time-consuming, laborious, and expensive, require careful safety precautions, generate hazardous waste, use a lot of glassware and lab space and lack of degree of sensitivity needed for some applications.

Screening techniques for analysis of residues and contaminants

An immunoassay is a biochemical test that measures the concentration of a substance in a sample or sample extract, using the reaction of an antibody or antibodies to its antigen. In case of pesticide residues. immunoassay is particularly suited for polar, water-soluble pesticides and their degradation products that are generally difficult to analyze using conventional analytical methods. Comparisons of quantitative immunoassay with conventional single residue methods using gas or liquid chromatography to analyze specific pesticide/food commodities show that immunoassay can analyze four to five times as many sample in a given time period (Newsome et al., 1981; Newsome, 1985; Newsome, 1987). In addition, immunoassay can be simpler to use than conventional techniques, require less skilled personnel, minimum instrumentation time and comparatively inexpensive equipment. Some notable applications of ELISA give detection of particular herbicides in water and soil samples (Gabaldon et al., 1999; Wright et al., 1999). Nowadays, tests for pesticides are available mostly for herbicides belonging to triazine group - atrazine, cyanazine, but also test kits are developed for carbamates (carbofuran, aldicarb), acidic amides (alachlor, metolachlor), phenoxy acids (2,4-D), aldrin, paraquat ect.

Much more popular are immunoassay tests in mycotoxin analysis because usually different compounds are analyzed by single methods. Using immunoassays, it is possible to reduce time of analysis and to improve laboratory throughput. There are commercial test kits in different format - ELISA kits, strip kits, caps, immunoaffinity columns, available for all regulated mycotoxins. Analysis of animal samples is facilitating by ELISA kits available for some veterinary drugs as chloramphenicol, nitrofurans, corticosteroids and hormones. Usually monitoring of human exposures to polycyclic aromatic hydrocarbons is performing by monitoring of its metabolite benzo[a]pyrene in blood and urine (biomarker). Polyclonal and monoclonal antibodies against its DNA adducts have been developed and used in radioimmunoassays or competitive ELISA assays in order to monitor human exposure to benzo[a]pyrene (Santanella, 1988; Santanella, 1990).

Despite above mentioned advantages, immunoassays may not be as sensitive for some compounds as conventional methods, and they can have lower levels of reproducibility. Because immunoassays are compound-specific they are not suitable for multi-residue analysis. In some cases food matrix requires considerable cleanup work, therefore immunoassay may be no faster than conventional techniques. In addition, for some analytes with small molecules or having non-rigid structure it may not possible to develop antibodies. There are still a lot of discussions regarding cross-reactivity of specific antibodies with other chemicals present in food.

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MULTICOMPONENT CHROMATOGRAPHIC METHODS FOR DETERMINATION OF PESTICIDE RESIDUES IN FOOD

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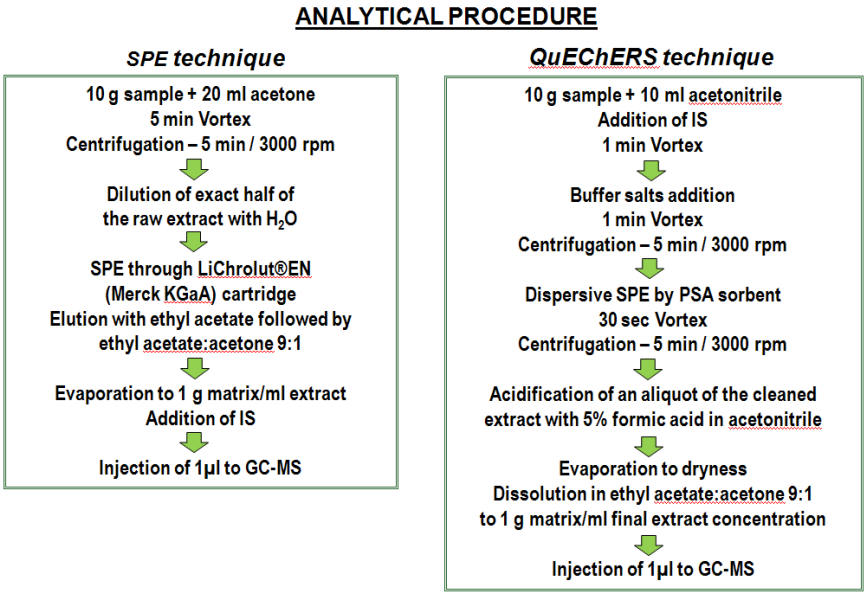

Figure 1.
Sample preparation procedure for the two techniques

Table 1. Average recoveries and LOQs for the analyzed compounds obtained by two methods

Pesticide group	Recovery range %		LOQ [mg/kg]	
	SPE	QuEChERS	SPE	QuEChERS
Organophosphates	88.3 ÷ 96.0	82.0 ÷ 109.8	0.9 ÷ 10.7	2.9 ÷ 35.7
Organochlorine	79.5 ÷ 94.3	75.2 ÷ 93.1	6.7 ÷ 9.1	9.9 ÷ 14.8
Pyretroids	84.1 ÷ 104.0	56.0 ÷ 103.9	2.8 ÷ 14.0	1.9 ÷ 34.3
Triazoles	90.3 ÷ 101.5	94.7 ÷ 107.5	2.4 ÷ 15.2	3.7 ÷ 15.1
Carbamates	89.1 ÷ 93.7	85.2 ÷ 103.3	3.4 ÷ 7.1	4.0 ÷ 9.6
Dicarboximides	89.4 ÷ 95.3	67.4 ÷ 104.6	4.9 ÷ 8.3	6.1 ÷ 30.5
Strobilurins	92.2 ÷ 97	84.9 ÷ 106.7	3.3 ÷ 5.8	4.2 ÷ 7.6

Different types of pesticides are widely applied to protect plants from disease, weeds and insect damages during plant growing and storage. Many of these compounds can remain as residues in foodstuffs after their application and

therefore they can pose serious risk for the consumers. Hence adequate pesticide residue control intended to ensure the safety of foodstuffs is needed. A brief overview concerning the analysis of pesticide residues by chromatographic methods in samples of plant origin is presented. The basic principles and recent developments in the sample preparation (extraction and clean-up), detection and quantification are discussed. Comparison between traditional solid phase extraction techniques and so-called QuEChERS (quick, easy, cheap, effective, rugged, safe) approach is emphasized. Possibilities and limitations of single quadrupole mass spectrometer for quantitative determination are also discussed.

EXPERIMENTAL AND NUMERICAL STUDY OF THE HENS EGG BEHAVIOUR AT THE IMPACT

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ABSTRACT

Hens eggshell behavior at the impact by a circular rod is studied. The instrumentation of the rod enables to obtain time history of the force at the point of the bar impact. The velocity of the rod is gradually increased up to some critical value at which the eggshell failure starts. At the same time the surface displacement of the eggshell is also recorded. The numerical simulation of the egg behavior under this impact has also been performed. LS DYNA 3D finite element code has been used for the evaluation of the force and surface displacement at the points of their experimental detecting. The experimental results well agree with numerical ones. The elaborated computational procedure has been future used for the numerical simulation of the Hens eggshell behavior at the impact on a rigid plate. Qualitative features of the numerical simulation agree with results recorded using of the high speed camera.

INTRODUCTION

Eggs can be regarded as naturally packaged food. When examining the quality of the packaging, one primarily considers the strength of the eggshell. The eggs are exposed to many different kinds of loading occurring during their collection, within the sorting equipment, and during transport. There exist several techniques to determine the material strength of an eggshell see e.g. (Kemps et

al., 2006).These experimental methods can be defined as quasi – static and dynamic. Most of works performed up to now have been performed under static loading. Owing to the fact that practice loads on the eggshell have a dynamic nature and so the dynamic strength of an eggshell could relate better to conditions experienced during handling and transportation of the eggs. As the measure of the shell strength the dynamic stiffness K_d was introduced (Coucke, 1998).To determine K_d, the egg is excited by a small impact, and the vibration behavior is registered. Subsequently from the resonant frequency and the mass of the egg, the K_d is calculated.
In the given paper the method of the measurement of the dynamic strength of the eggshell is described. This met odd enables to measure not only vibration behavior but also the time history of the loading force. Preliminary experimental results together with the results of a numerical simulation are presented.

MATERIAL AND METHODS

For the experiments eggs of Rhode Islands hens co to bylo za vejce have been used. The eggs have been loaded by the impact of a free-falling cylindrical bar(6 mm in diameter, 200 mm in height – made from aluminium alloy) – see Fig. 1.

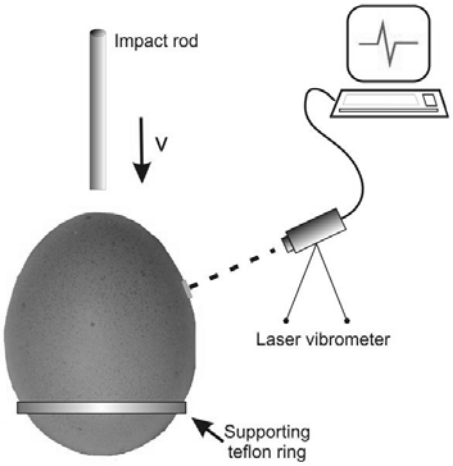

Figure 1.
Schematic of the experimental method.

At the point at the egg equator surface displacement as well as the surface velocity have been measured using of the laser-vibrometer. Eggs have been loaded by the bar impact on the pole (sharp or blunt) and on the equator. The height of the bar, *h*, has been changed up to the value at which eggshell fracture starts.

RESULTS AND DISCUSSION

In the Fig. 2 the experimental record of the forces at the point of contact between bar and egg is presented. One can see that there is a deviation from the shape of this function at the moment of the fracture origin.

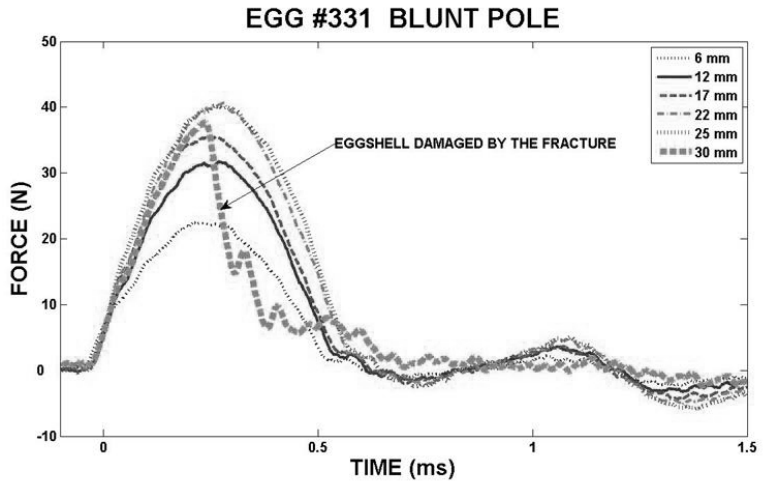

Figure 2.
Experimental records of the time history of the force at the bar impact.
The different values of heights h are given in the upper right corner.

For each type of the dynamic loading (i.e. impact on the blunt pole, sharp pole and on the equator).The value of the force F_{max} at which the eggshell breaks has been evaluated.
Even if the number of the tested eggs is limited one can see that the values of the force at which the fracture starts is very closed to that obtained at the quasi-static loading e.g. by a compression between two plates. The effect of the loading orientation is also the same like at the quasi static loading. This conclusion support a hypothesis that the mechanical properties of the eggshell are independent on the loading rate and/or on the strain rate, respectively. This is different result from the conclusion of the paper, where this dependence has

been reported. The next research and much more number of tests are needed for the explanation of the loading rate influence.

Numerical Simulation.

Similarly as in our previous works the eggshell is considered as linear isotropic elastic material. Its behavior is than described by the Young modulus E and by the Poisson constant ν. The same description is used for the eggs membrane. Eggs liquids are considered as compressible. No other rheological model can be implemented into the LS DYNA software.

Numerical procedure has been used for the simulation of the egg falling on the rigid plate with the striking velocity 1.4 m/s. This experiment has been recorded by the high speed camera and than it was simulated using of the LS DYNA finite element code. The numerical and experimental records of the eggshell fracture development exhibited a good agreement. Numerical simulation can not describe the real flow of the eggs liquids after the eggshell break. This is a consequence of the neglecting of the real behavior of the eggs liquids.

Concluding remarks.

In the given paper the experimental method of the eggshell dynamic strength evaluation has been described. This procedure extends the up to now used method of the evaluation of the dynamic behavior of the eggshell. Preliminary results show that the mechanical properties of the eggshell can be strain rate independent. The experimental method has been numerically simulated. The agreement between experimental and numerical results promise the evaluation of the stress state at the moment of the fracture origin. From the numerical computation the stress at which the eggshell fracture occurs can be obtained. This stress represents the eggshell strength. This strength is independent on the eggs shape as well as on the eggshell thickness. It seems that this strength is an intrinsic material parameter which may be affected by the eggshell microstructure, by its chemical composition and by some elements distribution.

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INVESTIGATION OF THE STABILITY OF COW BUTTER BY USING LASER REFRACTOMETRY

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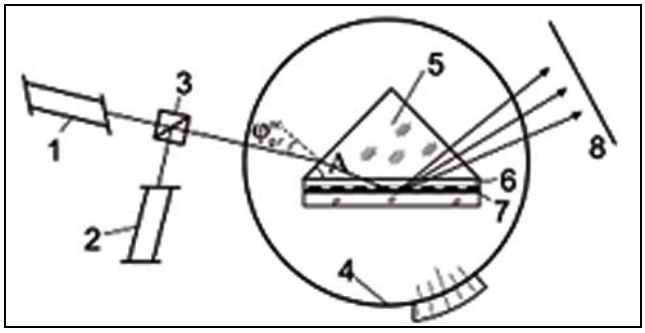
ABSTRACT



1 – He-Ne laser; 2-Laser pointer; 3-beam splitter; 4- goniometer;
5- heavy flint-glass prism; 6-sample; 7- metal grating; 8-screen.

Figure 1
Principle scheme of laser refractometer

An investigation of the change in the refractive index of "Fibella" cow butter was carried out over time by using a laser refractometer. Samples were stored at $(t = -18 \pm 2)^{\circ}C$ and were taken from butter on days 5, 30, 60, 120 and 150. Nonlinear regression models from type:

$$n = n_0 + A.\exp\left(\frac{-t}{B}\right)$$ were obtained.

$$n_{g,r} = N_{g,r} \sin\left[A \pm \sin^{-1}\left(\frac{\sin\varphi_{g,r}}{N_{g,r}}\right)\right], \quad (1)$$

where symbols "g" and "r" are for 532 nm and 632.8 nm wavelength, respectively; A is the prism (5) refracting angle, in our case – 65deg. Prism's RI are N_g = 1.748 and N_r = 1.735, made by heavy flint-glass TF-4. We have as a good approximation:

$$\Delta n_{g,r} \approx \cos A.\Delta\varphi \leq \cos 60^o.\Delta\varphi = 2.10^{-4}.$$

Table 1
Refractometric data for "Fibella" cow butter

Refractive index -n					
5 days		30 days		60 days	
532nm	632.8nm	532nm	632.8nm	532nm	632.8nm
1.4679	1.4619	1.4650	1.4586	1.4629	1.4552
1.4603	1.4570	1.4592	1.4532	1.4582	1.4503
1.4582	1.4555	1.4570	1.4520	1.4562	1.4492
1.4560	1.4492	1.4549	1.4473	1.4535	1.4460
1.4544	1.4397	1.4534	1.4393	1.4522	1.4389

Refractive index -n			
120 days		150 days	
532nm	632.8nm	532nm	632.8nm
1.4601	1.4531	1.4589	1.4525
1.4564	1.4488	1.4557	1.4486
1.4546	1.4461	1.4542	1.4458
1.4523	1.4446	1.4520	1.4444
1.4501	1.4381	1.4492	1.4377

THE TECHNIQUES USED FOR INFORMATION AND EDUCATION OF CONSUMERS SUFFERING FROM FOOD ALLERGY AND INTOLERANCE IN HUNGARY

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In Hungary, there are different informational and educational techniques for sensitive consumers, especially; the information channels “from product to patient” are various. The current labelling laws are not sufficient for consumers suffering from food allergy and food intolerance, so we have to provide the information in other ways about “free from” products.
The aim of our study was to evaluate existing management strategies of food allergy in Hungary, especially, the function of the current allergen labelling and the Hungarian Food Allergy and Food Intolerance Databank. The further aim of the research is essential to the patients suffering from the food allergy/intolerance best service opportunities, methods, finding intervention points or strategies on Hungary judged from more viewpoints for best one concerned. We analysed the function of the Hungarian Food Allergy and Food Intolerance Databank and used a special interview method.
The Databank completes the labelling laws. It is an alternative way for consumers suffering from food allergy and food intolerance to know the information about “free from” product. The Databank has published the ”free from” product list since the year 2000. This consists of an electronic data basis containing 9 categories.
The food safety includes the allergen information as well. The allergen information as consumers' information on the labelling are not sufficient and they do not replace the dietician counselling and patient management, despite this very important the full and reliable labelling, that is on the tag character the reliability of an allergen statement.

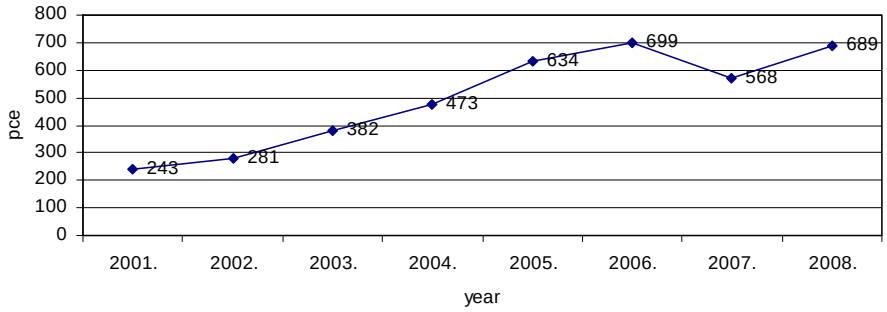

Figure 1
The number on the registered food
in Hungarian Food Allergy and Food Intolerance Databank
(pce/year)

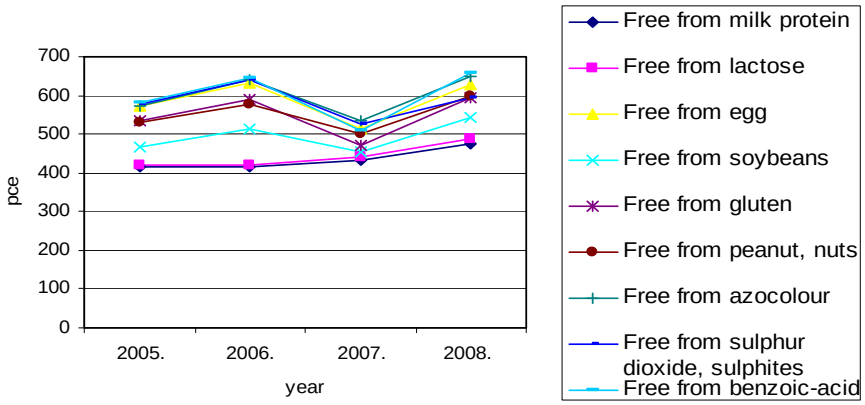

Figure 2
Product division according to free from categories
between 2005-2008

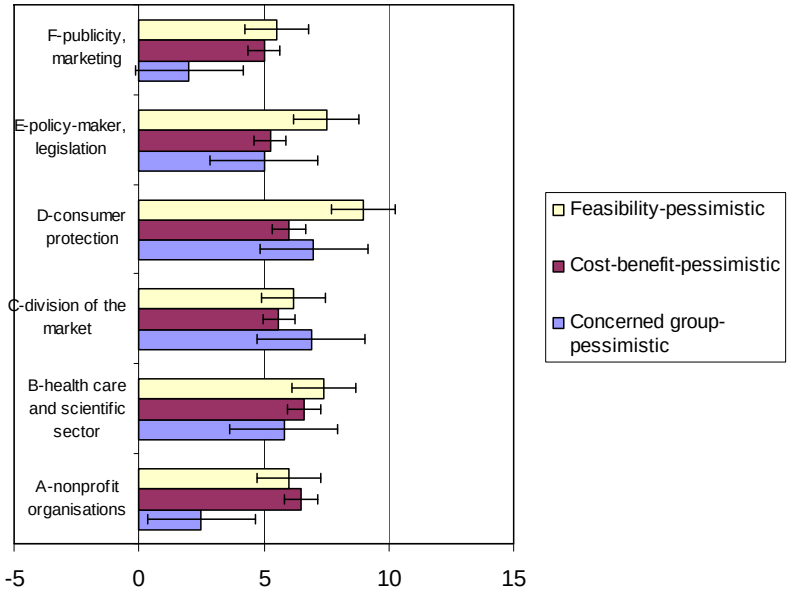

Figure 3
The necessity of the Food Allergy and Intolerance Databank
based on the different stakeholder groups'
opinion different criteria

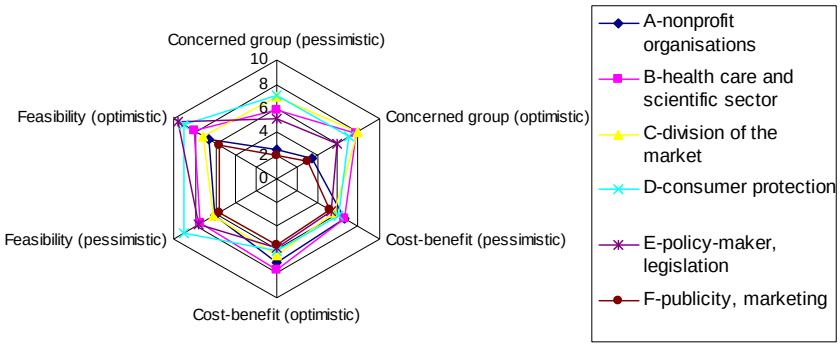

Figure 4
The necessity of the Food Allergy and Intolerance Databank based on the different stakeholder groups' opinion

RHEOLOGICAL PROPERTIES OF A GLUCOMANNAN OBTAINED FROM A PSYCHROPHYLIC YEAST STRAIN *SPOROBOLOMYCES SALMONICOLOR* AL$_1$

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ABSTRACT

Rheological properties of glucomannan were studied, such as its intrinsic viscosity (6.90 ± 0.22) dl.g-^{1}. The rheological profile of aqueous solutions of glucomannan was described by the power law $\tau = K\gamma^n$ as the value $0.33 \leq n \leq 0.60$ was not affected in a statistically noticeable manner by variations of concentration $0.25 \leq C \leq 2.0\%$ or temperature $25 \leq T \leq 82^0$C, which confirmed the pseudoplastic behaviour of glucomannan solutions as non-Newton liquids. It was shown that the structuring of the concentrated aqueous solutions of

glucomannan was due to the formation of hydrogen linkages between the relevant macromolecules.

INTRODUCTION

Konjac glucomannan is a neutral polysaccharide isolated from the tuber of *Amorphophallus konjac* c.Koch. It consists of β-1,4- linked D- D-glucosyl and D-mannosyl units at a ratio 1:1.6, with about 1 in 19 units being acetylated (Zhang et al. 2004). Konjac glucomannan is mainly used in food industry as a gelling agent, thickener, film former, stabilizer, emulsifier and soluble fiber source in bakery products, confectionary, dairy products, noodles, pasta, health foods, functional foods, frozen foods and ice cream, canned, minced meat and fish, salad dressing and sauces, pet foods, edible films and capsules (Nishinari et al. 1992; Ratcliffe et al. 2005). Polysaccharides containing D-mannose and D-glucose in similar proportions were isolated from plants and produced from yeasts (BeMiller et al. 1993; Adami and Cavazzoni, 1990; Chiura et al. 1982; Vorotynskaya et al. 1992; Pavlova et al. 2004). Yeast glucomannan is not marketed as a dietary supplement.
The aim of this paper is to present the study of rheological properties of aqueous solutions of glucomannan produced by the psychrophilic strain *Sp. salmonicolor* AL_1.

MATERIALS AND METHODS

Yeast strain *Sporobolomices salmonicolor* AL_1 was isolated from soil lichen taken from the region of the Bulgarian base on Livingston Island, Antarctica and selected as a suitable producer of exoglucomannan (Pavlova et al. 2004). It was registered in the National Bank for Industrial Microorganisms and Cell Cultures, Bulgaria, under № 08290. Exopolysaccharide production, isolation of crude exopolysaccharide and it chemical analysis was published in a previous article of ours (Pavlova et all 2004).
Intrinsic viscosity $[\eta]$ of glucomannan solutions was determined by measurements with capillary viscosimeter VPG 2 type Ubelode at temperature 25^0C. Experimental data processing was done by a computer program written in FORTRAN 77 on the grounds of an algorithm for finding a linear equation in accordance with Huggins equation (Morawetz 1967). The rheological profile of the aqueous glucomannan solutions was measured by means of a Rheotest – 2 Rheoviscometer, Germany, using measuring cylinder of the device N. The concentrated solutions of glucomannan under study were within the 0.50 – 2.50% range. The measurements were conducted at different temperatures in the

$25 \div 82^0 C.$ range. The Oswald-de Waale power law model (Holdsworth 1993) was used to describe the flow behaviour of glucomannan solutions

$$\tau = K.\gamma^n \qquad (1)$$

where τ is the shear stress (Pa), and γ is the shear rate (s^{-1}) K is the consistency index ($Pa.s^n$), n is the flow behaviour index (dimensionless)

The numerical values of the shear rate γ and the shear stress τ were processed using REOTEST computer program written in FORTRAN 77. During test data processing, the methods of the least squares were applied to find equations of simple and plural linear regression (Draper 1981). Numerical procedures implementation was performed by computer subroutines compiled by (Johnson 1980).

RESULTS AND DISCUSSIONS

The parameters established during the batch fermentation of the strain indicated that a temperature of 22 °C, aeration at 0.75 v/v/m and agitation at 500 rpm proved to be the most suitable conditions for polysaccharide synthesis. During the biosynthetic process, the apparent viscosity of the culture broth increased to the maximum value of 15.37 mPa.s, and the polysaccharide yield was 5.63 g/l on a culture medium containing 4.00% of sucrose and 0.25% of ammonium sulfate, at a temperature of 22^oC for 120 hours.

The following results were obtained from the experiments carried out with capillary viscometer VPG 2 type Ubelode at temperature 25^0C from Huggins equation

$$[\eta] = (6{,}90 \pm 0{,}22) dl.g^{-1} \qquad K''_H = 0{,}58 \pm 0{,}14$$

The rheological profile of glucomannan water solutions was determined at a shear rate γ at $1{,}5 \div 1312 s^{-1}$. The n values obtained during our studies from equation (1) for all solutions of glucomannan fell within the $0{,}33 \le n \le 0{,}60$ range, which showed that glucomannan behaved as pseudoplastic non-Newtonian liquids.

The quest for dependence of $n = f(C\%)$ and $n = f(T)$ did not yield satisfactory results. For all regression dependences the correlation coefficient was R<0.63. This was to show that n was not affected in a statistically noticeable manner by the variation of concentration and temperature.

The magnitude of the consistency index K grew with increase of concentration of solutions. Both exponential (Eq.2) and power type (Eq.3) relations were

found to be suitable for the description of the relationship between the concentration and the consistency index.

$$K = 1{,}064.\exp(0{,}9876C) \qquad (2)$$

the correlation coefficien R=0.932

$$K = 3{,}781.C^{0{,}883} \qquad (3)$$

the correlation coefficien R=0.976

The joint effect of the concentration C and temperature T on the K values was studied by means of a multiplicative model of multiple regression of the kind (4):

$$K = \alpha.C^{\beta}.\exp\left(\frac{\Delta E_a}{RT}\right) \qquad (4)$$

where α and β are constants, R – gas constant kJ/mol.K, ΔE_a – activation energy (kJ/mol)

Processing the experimental data was implemented using the MLRG software based on the least squares method for finding multiple regression within the range $0{,}25 \le C \le 2\%$ and changes in T within the $25 \le T \le 82^0 C$ range. The values obtained for the constants in equation (4) at a multiple correlation coefficient R_n=0.969 were:

$$\alpha = 4{,}75410^{-5}$$

$$\beta = 0{,}7579$$

$$\Delta E_a = 28{,}55 \pm 1{,}24 \frac{kJ}{mol}$$

According to (Cottreli 1954) the energy of the hydrogen bond is $\Delta E_a \approx 23{,}4 \frac{kJ}{mol}$

The value we obtained for the activation energy showed that, the hydrogen bonds established between the separate macromolecule chains had a dominant importance in the formation of structures in the aqueous solutions of glucomannan. Their ruptures when the velocity gradient γ was changed and the following recovery determined the pseudoplastic nature of glucomannan. The

value we obtained for the activation energy $\Delta E_a = 28{,}55 \frac{kJ}{mol}$ was very close to the value of the activation energy $\Delta E_a = 27{,}63 \frac{kJ}{mol}$

Obtained by Maekaji (Nishinari et al. 1992) on konjac mannan obtained from the tuber of the Amorphophallus konjac plant c. Koch.

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LASER ABLATION OF FRUIT AND VEGETABLES

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ABSTRACT

This work considers the possibilities for peeling fruits and vegetables by treatment with a CO_2 laser. It was found that for the fruits under study the laser ablation provided an efficient peeling of the materials while preserving the organoleptic properties, such as freshness, naturalness, and texture. As a result of the treatment, a number of aroma substances were released, as well as plant cells, which could be used in the production of edible food coatings - an alternative to emulsion produced biopolymer films.
After laser treatment of citrus fruit (oranges and lemons), the fruits were peeled and pectin was extracted from the peels by means of a classical type of extraction in HCl water solution. The pectins obtained were studied for yield, degree of esterification, polyuronic content, molecular weight, gel strength and other physico-chemical prop-erties. It was found that in all samples the laser pretreatment of the materials led to an increase in the pectins yield, gel strength and purity, at an insignificant reduction of its molecular weight and degree of esterification.

The molecular (meanviscosimetric) weight of the pectic macromolecules was calculated from the equation of Mark-Houwink

$[\eta] = K.M^{\alpha}$ as both the constants and

$K = 9{,}55.10^{-2}$ $\alpha = 0{,}73$

Table 1
Experimental results on the yield and physicochemical properties of pectin from oranges and lemons

Sample	Treatment	Pectin yield %	Purity %	DE %	$[\eta]$ dlg^{-}	M_{η}	GS_{0} TB
Thin-skinned lemons	Control Laser ablated	8,9 10,8	86,2 90,1	61,4 59,2	2.62 2.62	93 000 93 000	240 255
Thick-skinned lemons	Control Laser ablated	13,0 16,2	88,8 91,2	64,7 61,2	3.32 2.31	133000 78 000	270 280
Oranges 1	Control Laser ablated	9,0 12,0	77,4 80,1	58,4 56,2	1.16 1.39	31 000 39 000	225 230
Oranges 2	Control Laser ablated	9,1 11,6	78,4 81,3	59,0 56,8	1.17 2.32	32 000 79 000	240 250
Oranges 3	Control Laser ablated	13,1 16,5	77,9 80,2	65,2 65,0	4.33 4.52	186000 197000	270 285

COMPARISON OF THE ANTIOXIDANT ACTIVITY IN BERRIES AND FRUIT PRODUCTS MADE FROM BERRIES

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ABSTRACT

Berries (raspberry, blueberry, blackberry, black and red currant, gooseberry, etc.) are one of the popular group of fruits. They contain pigments in a big

quantity. These pigments belong to the group of the anthocyanidins and are mostly flavonoids. These compounds are very important in the healthy nutrition. Our aim was to examine the berry species known on Hungary and the prepared foods from them. We wished to collect data with the examinations the fruit's antioxidant characteristics, and to find contexts concerned with the measured antocianidin pigment content with C-vitamin content.

Table 1
Analytical results: vitamin C, anthocyanidin and antioxidant activity in raw fruits

BERRY (Latin name)	**Variety**	**Harvest time**	**C vitamin mg/100g**	**Antho-cyanidin mg/g**	**Anti-oxidant activity I50, mg**
Elder (Sambucus nigra)	Haschberg	Aug 30	240,0	53,85	0,165
Black currant (Ribes niger)	Titania	July 05	238,2	21,10	0,119
Blueberry (Vaccinium myrtillis)	Heidii	July 05	213,8	12,18	0,423
Blackberry (Rubus fruticosus)	Loch Ness	July 05	203,4	46,80	0,090
Red currant (Ribes rubrum)	Jonkeer v Tets	July 05	114,1	7,50	0,552
Josta (Ribes uva-crispa x Ribes nigra)		July 05	110,4	11,85	0,428
Gooseberry red (Ribes uva-crispa)	Rokula	July 05	79,0	8,36	0,484
Raspberry (Rubus idaeus)	Rumilova	July 05	45,4	5,40	0,457
Grape red (Vitis vinifera)	Hamburgi muskotály	Sept 24	45,1	7,49	0,312
Raspberry yellow (Rubus idaeus)	Golden Bliss	July 05	33,6	0,37	0,336
Cranberry (Vaccinium macrocorpon)	Koralle, Pilgrim	Sept 11	28,1	3,49	0,724
White currant (Ribes rubrum)	Blanka	July 05	24,4	2,43	0,522
Rose hip (Rosa canina)		Sept 30	127,2	1,615	0,011

Highest (more than 200 mg/100 g) C-vitamin content was measured in the elder, black currant, blueberry and in the blackberry. Very high (50 mg/100g) anthocyanidin quantity was measured in the elder and the blackberry. High pigment content (10-20 mg/g) was in the black currant, blueberry and in the

josta. Anthocyanidins and C-vitamin are responsible for the antioxidant activity together.
The quantity of antioxidant activity in fruit-foods differ from that of the fresh fruits with an order in generally. We found very big differences in measured nutritional value because of different quality of jams and frozen fruits.

Table 2
Analytical results: vitamin C, anthocyanidin and antioxidant activity in fruit-foods

BERRY Food type	**C-vitamin mg/100g**	**Antho-cyanidin mg/g**	**Anti-oxidant activity I50, mg**	**BERRY Food type**	**C-vitamin mg/100g**	**Antho-cyanidin mg/g**	**Anti-oxidant activity I50, mg**
ELDER				RASPBERRY			
fresh	240	53,8	0,165	fresh	45,4	5,40	0,457
Sokoró jam	22,0	19,2	0,875	frozen	48,4	4,61	0,821
Botész jam	55,5	23,9	0,198	Pacific jam	17,2	0,10	1,265
Botész pulp	69,1	53,3	0,108				
BLACKBERRY				RED CURRANT			
fresh	203	46,8	0,09	fresh	114	7,50	0,552
frozen	39,3	12,1	0,861	frozen	48,6	5,62	0,777
canned	37,2	7,70	0,984				
BLACKCURRANT				STRAWBERRY			
fresh	238	21,1	0,119	canned	15,8	1,69	1,036
Pacific jam	16,9	0,55	1,350	Pacific jam	15,8	0,00	2,086
Pacific mini jam	20,7	0,10	1,048	frozen	24,4	7,08	0,908
Blueberry				rose hip			
fresh	214	12,2	0,423	fresh	127	1,61	0,011
Herbária jan	17,7	2,24	0,508	Botész jam	69,1	1,86	0,376
St Dolfour jam	18,8	3,49	0,996	Vácrátót jam	34,6	1,06	0,809
Pacific jam	16,1	0,10	1,330	Herbária jam	18,5	1,43	1,296
				Pacific jam	17,4	0,54	0,953

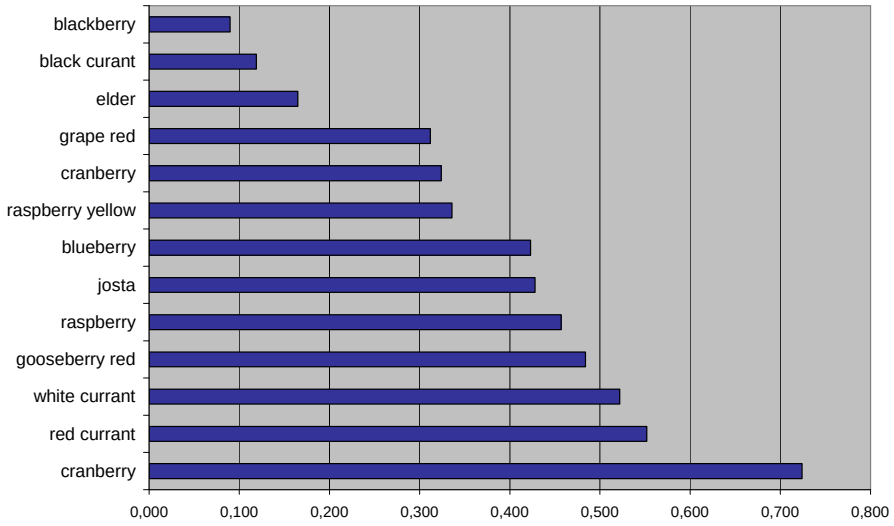

Figure 1.
Antioxidant activity of fresh fruits (I_{50} mg)
mg sample necessary to 50% inhibition in colour of DPPH reagent

EFFECTS OF SOME EXTRUSION PARAMETERS ON THE HARDNESS OF EXTRUDED LENTILS

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The objective of this research was to study the effects of moisture content (18, 20, and 22%), and screw speed (100, 150, and 200 rpm) on the hardness of extruded lentils. The lentil semolina was extruded with a single screw extruder (Brabender 20 DN) at constant barrel temperature (160ºC), screw compression ratio (2:1), and die diameter 4 mm. The hardness of the extrudates was measured with a TA.XT Plus Texture Analyser, Stable Micro Systems. The textural profiles of the extrudates showed that feed moisture had the highest effect on the hardness.

	Levels		
Moisture content (%)	18	20	22
Screw speed (rpm)	100	150	200

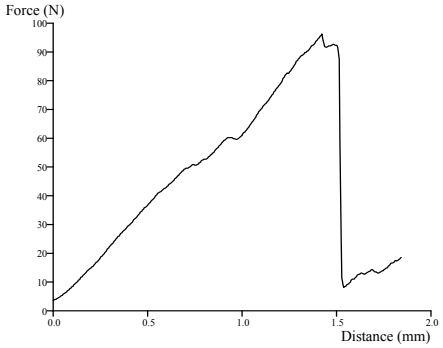


Figure. 1
Typical curve of extruded lentil tested
with TA.XT Plus Texture Analyser

$F = -221{,}056 + 21{,}25W + 0{,}05n$, (N)
Where F – measured force, N; W – moisture content, %; n – screw speed, rpm.

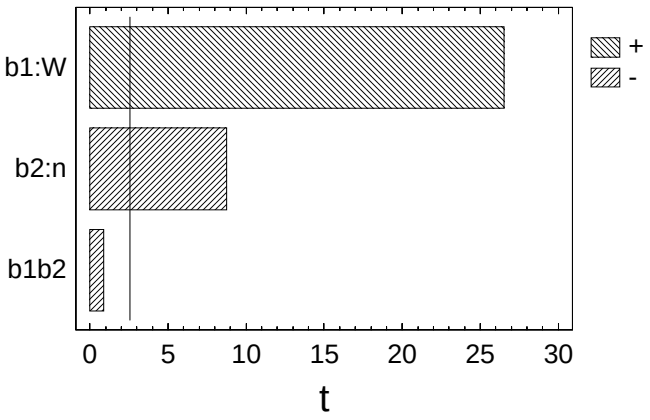
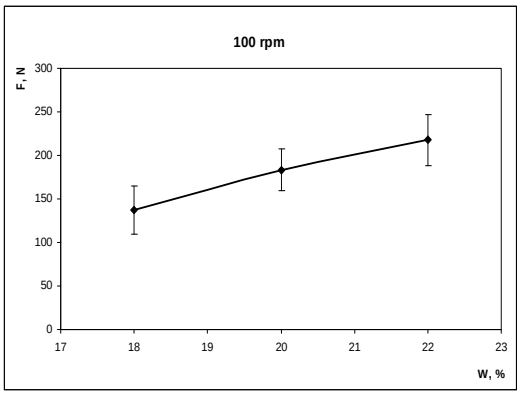
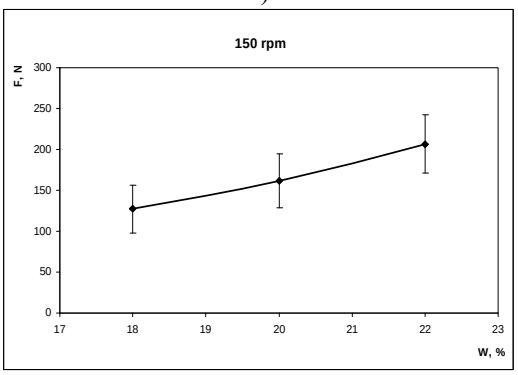


Figure2
Standardized estimated effects of regression model coefficients
on the hardness
(R-squared = 99.3619% Standard Error of Est. = 3.51347)



a)



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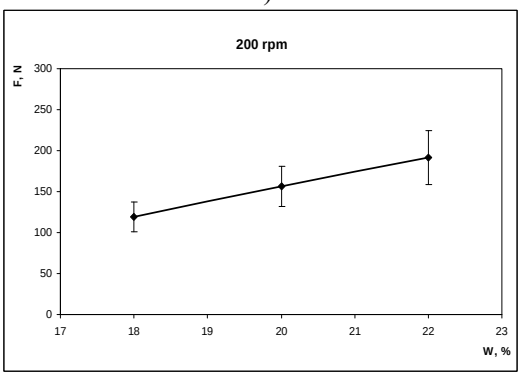

c)

Figure 3
Hardness vs. moisture content of extruded lentil at various screw speeds

RESEARCH ON THE ECOLOGICAL CONDITION OF THE AGRICULTURAL OBJECTS AFTER THE IMPACT OF POTENTIAL CONTAMINATION

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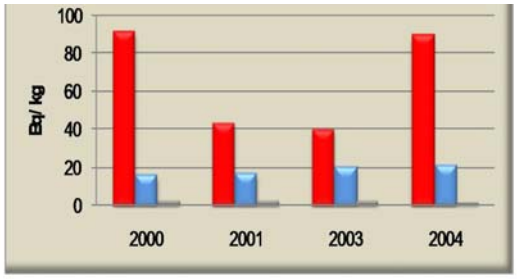

Figure 1
Contents of Cesium-137 in Soil Samples
from North-West Bulgaria (Bq/kg)
(min, an average value and max)

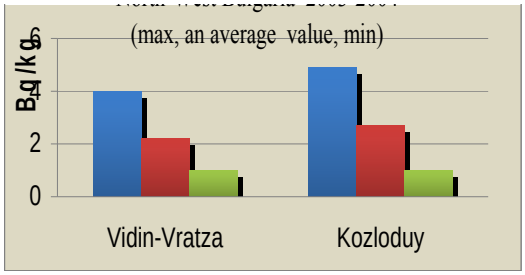

Figure 2
Contents of Strontium-90 in Soil Samples
from North-West Bulgaria (Bq/kg) 2003-2004
(max, an average value, min)

The appearance of biological, chemical and radioactive polluters in foods creates a potential risk for the health of the consumers. The polluters in foods can have direct effect and future health effect. Potentially risky substances enter in foods in a consequence of the pollution of the environment due to the transport and industry as well as the violation of the good agricultural and production practice.

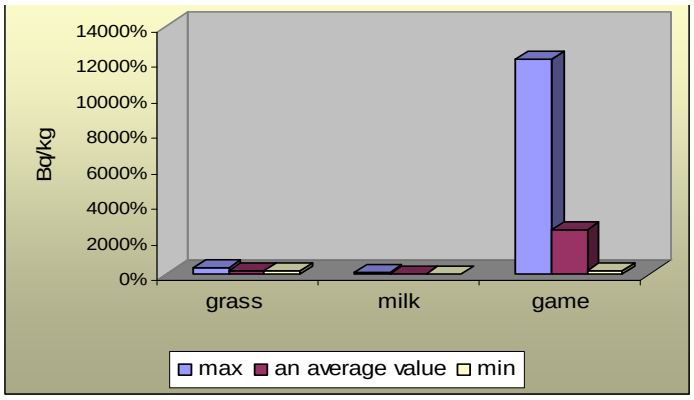

Figure 3
Contents of Strontium-90 in Biological Entities
from North-West Bulgaria (Bq/kg) 2000-2004
(max, an average value, min)

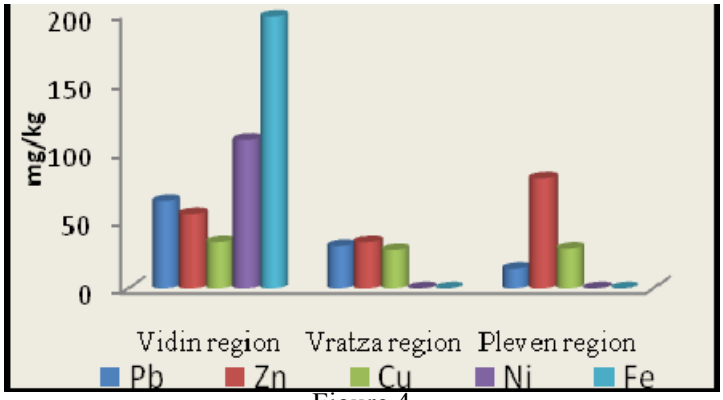

Figure 4
Contents of Heavy Metals in Soil Samples
from North-West Bulgaria (mg/kg) 2000-2004

The radiation pollution on the territory of Europe after the Chernobil accident poses a new problem – late consequences due to the components of the radioactive tail, included in the composition of the agricultural products and feed raw materials.

The nuclear power station "Kozlodui" turns up a potential source of radioactive impact upon the population and the environment in case of an accident. The main technological equipment and systems in case of an accident may provoke

radioactive emissions on the territory of the nuclear power station and the environment around it.
These circumstances define the priority of the radiation monitoring in the North-West of Bulgaria. During the period 2004 – 2007 we carried out researches on the content of radionuclides in soil, cow milk, fish, game and other agricultural objects.
The obtained results on the pollution level of the examined samples show that it is considerably below our national and European standards.

THE FREQUENCE OF BRUCELLOSIS IN THE SOUTHERN REGION OF ALBANIA IS CAUSED BY FOOD PRODUCT

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INTRODUCTION

Brucellosis is a contagious disease, caused by the Brucellosis type bacteria. It is also known as the Mediterranean disease.
Albania has the biggest number of people being infected by it. This disease is transmitted from animals to people, causing "Malta Fever" to them.
Before 1990, our country was pronounced not to be under the risk of brucellosis. But after 1990, the political, social and economic changes in Albania brought also the improper functioning of the vet and food hygiene structures and due to this, there was also an increase of the brucellosis infection to the animals and mostly to the people.
According to the reporting health sources, actually it is one of the most contagious and dangerous diseases in Albania for the people in the rural and urban areas, alike. This fact is due to the distribution of the food products.
One of the most distributed kinds of Brucellosis in our country, just like all around the world, is Brucella Melitensis.

Brucellosis

Brucellosis is one of usual bacterial zoo-noses in the world, caused by organisms concerning brucellosis genre.
In Albania, brucellosis has an early origin. The first case in humans was dictated in the year 1925, in Gjirokaster.

MATERIAL AND METHOD

For the period 2001-2007, getting to the study in South Region of Albania and especially in Gjirokaster range, are isolated and identified 2323 cases with brucellosis in all infected and carriers.
Brucellosis is identified across agglutinative proof in glass and across the R. Wright proof. Both these methods are used in the same way to bring out more correctly results.

RESULT AND DISCUSSION

In Bacteorogical Laboratory in Gjirokaster Range the 2323 isolated cases, with patients and carriers for the years 2001-2007, have resulted brucella melitensis. For the popularity of South Region of Albania, this number is to take on consideration and to estimate the disease causers have to take measures for reduction of cases with brucellosis.

CONCLUSION

1. During the years 2001-2007, in the Southern Region of Albania, 2323 cases of sick persons with brucellosis and chronic patients were isolated. We notice a growth as compared to 10 years ago, which shows the underestimation of the brucellar infection. The distribution of the cases according to the seasons reveals the predomination of the disease in spring, especially during the months, when the number of brucellas is higher, like April, May, June, July, august with 1234 cases or 54%. This is because it coincides with the period of births and abortions, particularly in the sheep, and in the lactation period.
2 As regards the age groups, the most affected from the disease is the age group of 15-60 years.

RECOMMENDATIONS

The work between the medical and veterinary institutions must be intensified and their activity must be coordinated in order to:

- prevent
- diagnose
- and treat the disease on time

For this, a control strategy for the uprooting of brucellosis is required, namely:

- The prevention of the movement of animals and the monitoring of free zones of brucellosis.
- The elimination of positive animals.
- The vaccination of herds.

While in the practical plan, in the relations with the customers, the following must be taken care of:

- The slaughter of animals in slaughter-houses under the supervision of the specialist.
- The sale of necessarily certified animal products and sub-products.
- The close cooperation between the Veterinary Service and the Hygienic-Sanitary Service.

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DEFINITION OF PHYSICOCHEMICAL PARAMETERS OF COW'S MILK

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ABSTRACT

Milk is one of the most valuable food stuff. It contains all nutrients necessary for human life. Quality of milk as uniform physicochemical system depends on characteristic of components containing in them. Therefore, any changes in content and condition of milk components should be accompanied by changes of its physicochemical properties.

Definition of physicochemical properties of unboiled cow's milk from various settlements of the Grodno region with aim of definitions of its quality was the task of this work.

Indexes of acidity and density were studied in this work. Acidity of milk is determined by method of acid-base titration and potentiometry. Titratable acidity of (oT) milk depends on a ration of feeding, breed, age, individual features of animal. Rise of acidity of milk to 20-25 oT as a rule depends on deficient quantity of salts of calcium in forage. Besides, acidity of milk increased at storage at development in them of microorganisms. Deacidification of milk can be caused by its falsification, notably by dilution by water.

At dilution by water tightness and weight fraction of neutral fat is reduced. It is considered to be that tightness of milk decreased approximately on 3 kg/m^3 on each ten percent of added water. For natural milk tightness is 1029 kg/m^3. Removing of cream or dilution by skim milk (which tightness make up 1033 - 10.35 kg/m^3) caused by rise of tightness. Change of milk density also caused by various diseases of animals, for example mastitis.
Thus, on base of received results was established that physicochemical parameters can variety under the influence of various factors (phase of lactation, diseases of animals, etc.), and also at milk falsification. Therefore their definition allows estimating of naturalness, quality and suitability of milk to processing in different dairy products.

PHYSICAL CHARACTERISTICS OF SEA BUCKTHORN BERRIES GROWN IN 2007

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ABSTRACT

Sea buckthorn (*Hippophae rhamnoides* L.) is a native bush to Europe and Asia that produces orange to yellow berries. Its berries have a wide range of uses in medicine and also in food industry.
Harvested sea buckthorn berries proceed to several processing operations which all emphasize knowing all the necessary data about their physical properties like size, shape, weight, moisture content and firmness.
Size and shape showing the uniformity are important features to achieve the highest level of efficiency in processing. Moisture content refers to the juicy of the berries. Force and energy required to rupture the sea buckthorn berries depend on several factors as the strength of the skin, the firmness of the flesh, the viscosity of the juice, the turgid pressure, and the size of the fruit.

INTRODUCTION

Sea buckthorn (*Hippophae rhamnoides*) is native to Eurasia and the plant is noted for its impressive range of uses: for soil conservation, as an ornamental, in the tea industry, and especially as a fruit, which is rich in vitamin C and other nutritional and bioactive compounds (Tang, 2000).

The aim of this work was to determine physical characteristics like size, weight, firmness and moisture content of sea buckthorn berries grown in Estonia in 2007.
The properties of berry vary within the species and therefore the present study concentrates on measuring the physical characteristics of eleven different species of sea buckthorn berries.

MATERIALS AND METHODS

In 2007 several species of sea buckthorn berries grown in Estonia were gathered and analyzed: Avgustinka (AVR), Botanitseskaja (BOR), Botanitseskaja Aromatnaja (BOA), Botanitseskaja Ljubitelskaja (BOL), Gibrid Pertsika (HPR), Hergo (HER), Otradnaja (OTR), Podarok Sadu (PSR), Sirola (SIR), Trofimovskaja (TRR) and Vorobjevskaja (VOR). Most species are from Russia, HER and SIR from Germany.

1. Berry size and weight

Berry size was determined measuring berry basic parameters like width, length and thickness with a micrometer. Amount of berries taken under measurement was 30. Berry shape was calculated and presented as geometric mean diameter D_g (Mohsenin, 1970):

$$D_g = (LWT)^{\frac{1}{3}}$$

For calculating sphericity (Φ) the following equation was used (Mohsenin, 1986):

$$\Phi = \left(\frac{(LWT)^{\frac{1}{3}}}{L} \right) \cdot 100$$ where L is length, W width and T thickness.

Weight was measured with analytical balance as the weight of 30 berries.

2. Berry firmness

Firmness was measured with texture analyzer TA- XT2i (Stable Micro Systems, UK) which evaluates the force required to rupture the sea buckthorn berry. For each test, a single berry was placed onto the plate and compressed with the probe. Experiment was repeated up to 40 berries.

3. Berry moisture content

To measure the berry moisture content the berry had to be comminuted to increase the efficiency and accuracy of results. The procedure was repeated three

to four times using halogen moisture- analyzer Mettler Toledo HR83 (Mettler Toledo, Switzerland).

RESULTS AND DISCUSSION

1.Berry size and weight

Berry size, weight and sphericity vary between different sea buckthorn species, but disparity is not so significant. BOR has the highest parameters: width, length and thickness 9,33mm, 11,92mm and 9,33mm, respectively. The smallest berry is HER with width 6,51mm, length 8,40mm and thickness 6,51mm. Geometric mean diameter is according to size parameters greatest for BOR and smallest for HER.
About weight, as can be found according to size parameters, BOR is the heaviest and HER is the lightest.
Sphericity as the measure of dimensions for products, which do not have an exactly defined geometric form (Alfonso, 2007), reveal that sphericity does not depend on the weight nor geometric mean diameter. The heaviest and the biggest berry in the present study is BOR, but it does not have the highest value of sphericity, PSR does, 84,9 and 85,0%, respectively. Lightest and the smalles berry is HER, which sphericity is 84,4%, is one of the roundest berry under the observation. BOL and VOR both have the lowest value of sphericity, which is 76,5%.

2. Berry firmness and moisture content

The minimum values of firmness are not differing significantly staying around 117g, except HER which minimum firmness 162g. BOR and VOR maximum firmness is lower than other species around 256g, while the rest are similar to the average maximum value of 350g.
Berry moisture content refers that moisture content in sea buckthorn berry is from 81,26% to 86,87%, averagely and differs by species. AVR has the highest moisture content reaching to 86,87%. On the other hand, HPR moisture content is only 81,26%.

Discussion

The study revealed that Russian originated sea buckthorn berries are slightly bigger than German species HER and SIR which are one of the smallest berries under the research.

The widest berry is BOR- 9,33mm, the longest is HPR- 12,44mm and the thickest is also BOR- 9,33mm, which has also the greatest geometric mean diameter 10,12mm. The smallest berry among the others is HER, which width, length and thickness are 6,51mm, 8,40mm and 6,51mm, respectively. Generally, length of berries studied in the present research is between 8,40 and 12,44mm, width and thickness are in range of 6,51- 9,33mm. Compared to results from scientific literature of sea buckthorn berries grown in Estonia in 2006, the berries have gone slightly shorter and thinner. In 2006 berry length was from 10,64 to 13,71mm, width and thickness from 7,79 to 9,03mm.

Weight of berry in the present study was between 0,30 and 0,73g, where the lightest berry was HER and the heaviest BOR, respectively. Compared to data from the year of 2006 when the weight of the berry was 0,49 to 0,85g, which is higher value than the present berries have.

Sphericity of sea buckthorn berries in the present study is between 76,5 and 85,0%,

BOL and VOR both have the lowest sphericity, PSR has the highest value of sphericity, respectively.

Firmness of berry depends on strength of the skin, the firmness of the flesh, the viscosity of the juice, the turgid pressure of the fruit and the size of the fruit (Khazaei, 2004) and that may be the reason why HER with the most discreet proportions, shows the highest firmness value which ranged from 162,06 to 374,51g. BOR which was the biggest berry, shows firmness from 106,81 to 256,13g. Generally, the firmness was between 154,67 and 282,21g, averagely.

Observing the results of the present study and Graphic 1, it can be said that there is a dependence between the geometric mean diameter and firmness of the berry. The smaller the berry geometric mean diameter is, the higher firmness value it has.

Moisture content in analyzed berries was in the range from 81,26 to 86,87%. The highest moisture content was in AVR and the lowest in HPR. Average moisture content taken all species and samples into consideration was 83,10%. Compared to results of year 2006, moisture content has decreased from the level 84,9% to 83,10%.

The present research shows that sea buckthorn berries have different physical characteristics depending on the variety of species and through years.

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APPLICATION OF TEXTURE ANALYZER IN THE QUALITY ANALYSIS OF BAKERY PRODUCTS

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INTRODUCTION

Bread is a basic foodstuff for the Center European people. There are several traditions on bread making in Hungary but the consumers and the industrial bread production requires a stable product quality. Because of the different quality parameters of the applied flours several additives used in production to stabilize bread quality, both in taste and texture.

Texture analysis is primarily concerned with the evaluation of mechanical characteristics where a material is subjected to a controlled force from which a deformation curve of its response is generated. These mechanical characteristics in food can be further sub-divided into primary and secondary sensory characteristics which have proven to be correlated to sensory perception. The primary characteristics parameters are the hardness, springness, adhesiveness and cohesiveness (Figure 1.) (Szczesniak et al (1963). Bourne (1978))

Texture analysis is an objective physical examination of baked products and gives direct information on the product quality, oppositely to dough rheology tests what are inform on the baking suitability of the flour, as raw material (Baik and Chinachoti, 2000; Charson and Sun, 2001; Szczesniak, 2002). This is why the texture analysis is one of the most helpful analytical methods of the product

development, as it is suitable to quantify the effects of flour blends and additives on physical properties of crust and crumb of the breads. It is also suitable to examine the effects of storing and freezing on different sensory properties of these products and thence it is suitable to analyze the results of different recipes in product development.
In this study we have examined the possibilities of texture analysis on different (commercial and experimental) bread products to explore the possibilities of this equipment in product development.

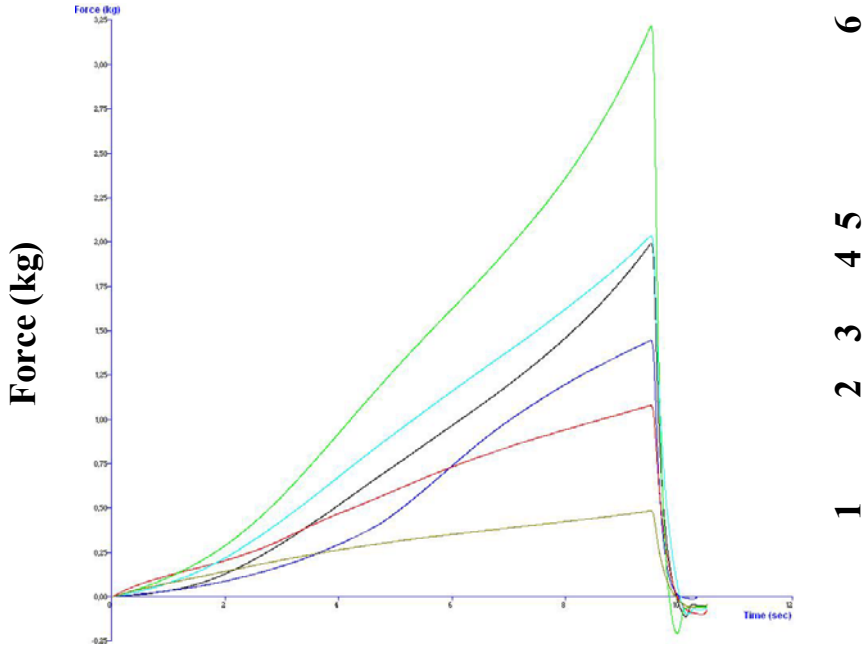

Figure 1
Results of texture analysis on commercial bread samples.

biscuit flour	**(6)**
strudel flour	**(5)**
bread from BL55	**(4)**
test loaf from BL80	**(3)**
white bread from shop	**(2)**
semi-brown bread from supermarket	**(1)**

MATERIAL AND METHODS

The analysed commercial bread and other bakery products were from a shop of an international hypermarket and from a shop of an entrepreneur. Six different samples were examined in this case: bread from BL55 (aestivum wheat flour with 0,55% ash content, recommended for pie) and BL80 (aestivum wheat flour with 0,8% ash content, recommended for white bread) flour, cake flour, white bread from a small shop, white and semi-brown bread from a hypermarket. In the second case a by product, dried apple pomace was milled to flour and added in 10, 20 and 30 % ratio to white bread flour to increase the fiber content of bread made from it. The crude protein content of these samples was determined by MSZ EN ISO 5983-1:2005., crude fiber, starch, dextryne, all and soluble carbohydrate and sugar content were determined by MSZ 6369-12:1979., crude fat content was determined by MSZ 6830-6:1984.Texture analysis was made by TA-XT Texture analyzer (Stable Micro Systems Ltd, Surrey UK).

RESULTS AND DISCUSSIONS

The results of texture analysis of different commercial bread products can be seen on Figure 1. In Hungary the bread from white flour (BL80) is the commonly consumed bread. It is visible that it has relatively low hardness. More than 25% hardness was shown by the test loaf made from BL80 what verifies that the industrially used flour additives decrease the hardness of crumb. In accordance to our expectations the application of smaller degree of meal results much harder dough and much harder bread crumb structure; so the breads made from BL55 wheat flour (recommended for pie) and from strudel flour have twice hardness as white bread has. The biscuit flour resulted bread with the highest hardness from the examined raw materials; its crumb has threefold hardness as white bread had. The 6th examined sample was a semi-brown bread made in the bakery of an international supermarket. This sample has the much weaker crumb; its hardness was half of the white bread made in a local bakery.

In the second experiment our aim was to increase the fiber content of bread by the addition of a low price by-product of juice processing. We have tried to find that apple pomace concentration what is high enough to decrease significantly the energy content of bread but low enough to keep the original structure of crumb.

These results had agreed to the results of sensory analysis: the 10% pomace addition did not caused significant sensory effect on the test consumers, but 20 and 30% addition increased the density of crumb as much as the reaction of consumers was negative. On the other hand, chemical analysis proved that 10% pomace addition has almost the same effect on energy content as 20% addition

while the increase of carbohydrate and protein content continuously decreased, fiber and fat content continuously increased by the percentage of added apple pomace.

Conclusions

Texture analysis is suitable analytic method to compare bakery products and, after several reference data, may be suitable to determine the type of unknown samples. The results of instrumental measures are comparable to sensory analysis and it can result numerical results for the further statistical analysis.

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FOOD SAFETY AND FOOD PHYSICS – ASPECTS IN FOOD PROCESSING AND QUALITY CONTROL

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ABSTRACT

The paper deals with some special questions of aspects of food safety and application of methods of food physics in food processing and in food quality control and assurance, as well (Figure 1). The role of food safety has developed

significantly in the last decades, so today the production and processing of safe and quality food is of primary importance. Modern food production is based on principles of GAP and GMP (including GHP) and different methods and tools for quality assurance (HACCP, ISO-9000, ISO-22000, TQM).

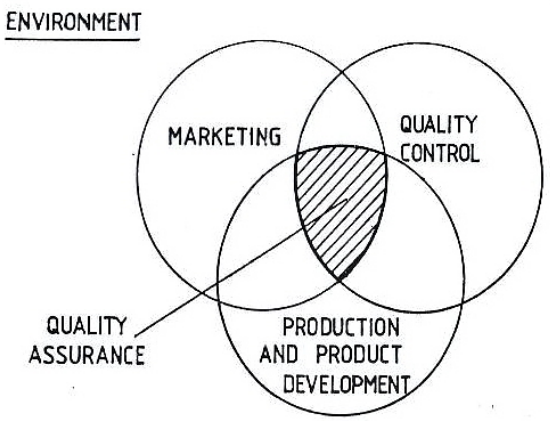

Figure 1
Fod processing and in food quality control and assurance.

There are many techniques and methods to produce safe food and to control the quality of foodstuffs. The modern, up-to-date technologies and measurement techniques involve the application of different physical methods – high pressure, pulsing electrical field, non-destructive techniques (e.g. INAA, NMR, NIR-NIT), radiation treatments - as well. Using radiation technologies (not only nuclear techniques) it is possible to fulfil some important expectations of modern food processing, e.g. decrease of microbial contamination, improvement of sensory properties, increase of storability of products.

Factors determining the quality of food products

Basic requirement: safety (no harmful effects)
- Sensory properties, value of pleasure
- Quantity, volume
- Chemical composition
- Packaging, labelling
- Special (microbiological, toxicological, radiometrical) parameters

Rank of Hazards from Eating Food

The Experts	The public
1. Microbial safety	1. Pesticides
2. Over-nutrition	2. New food chemicals
3. Non-microbial safety	3. Chemical additives
a) contaminants	4. Familiar hazards
b) natural toxins	a) Fat & cholesterol
c) agrochemicals	b) Microbial spoilage
d) food additives	c) Junk foods

Food processing and food quality control

Food production is based on principles of GAP, GMP, GLP and GHP (Figure 2).

GAP – Good Agricultural Practice
GMP – Good Manifacturing Practice
GLP – Good Laboratiory Practice
GHP – Good Hygiene Practice

Quality control and assurance is based on principles of HACCP (Hazard Analysis Critical Control Points), ISO-9000 standards, TQM (Total Quality Management).

Safe food: from farm to fork in the whole chain
Safe food and quality food is not equal!
Quality food is safe, but safe food can be not quality food (e. g. not good sensory properties)

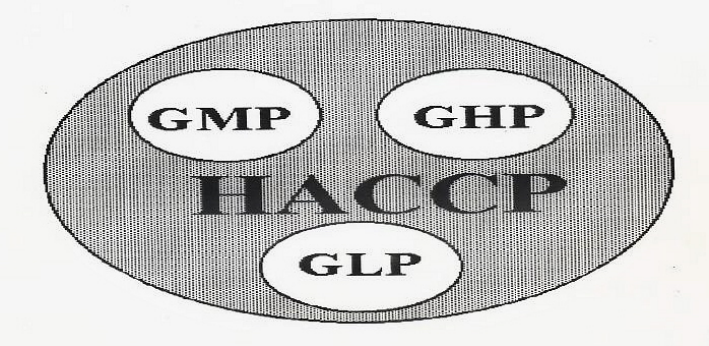

Figure 2
Components of Quality Assurance and connection between HACCP and GMP

3 main topics:

- physical parameters of foodstuffs
- physical methods for investigation of foodstuffs
- physical methods for treatment and processing of foodstuffs

Modern food technologies and food measurements are based on the principles of physics and physical methods:

- dehydration
- freezing
- lyophylization
- high pressure
- ohmic processing
- pulsing electrical fields
- magnetic fields
- nondestructive techniques (e.g. NIR-NIT, NMR, PAS)

Radiation methods and techniques in the food sector

- Ionizing radiation techniques and technologies (gamma-sources, X-ray equipments, electron accelerators)
- Non-ionizing radiation techniques (light-technique, IR, UV, Laser, SYNERGOLUX: UV+ozone, polarized light in radiostimulation)
- Isotope techniques, tracer techniques
- Radio-analytical techniques (e. g. AA)
- Measurement techniques (quantity, level, thickness etc.)
- Radioecology

Expectations in modern food processing

- Decrease the microbial contamination, disinfection
- Increase the storability
- Improve the sensory properties
- Apply environment-friendly and economical technique

Important standards

ISO 9000 (International Standards for Quality Management)
ISO 14000 (International Standards for Environmental Management)
ISO 22000 (International Standards for Food Safety Management)

ISO 9000-2000 (combination of ISO 9000 and TQM)

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THE MANAGEMENT OF RISKS IN THE EDIBLE OILS INDUSTRY

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ABSTRACT

Risk Management System is an important part of the developing and executing of a business plan in the food industry. Effective implementation of Risk Management System promotes best practice concepts at the corporate/strategic level as well as a improving of technological operation. A proactive approach of the Risk Management System should form a core part of the decision-making process at all levels within an productive organization.
The European legislation in the field of industrial risks management identify two types of risk:

- the chronic risk (integrated control and prevention of pollution).
- the accidental risk: fires, explosions, noise, air pollution, water, waste pollution resulting from the radioactivity.

The objective of this paper research is to define a Risk Management System in the edible oils industry and to identify the axes of reforms to conduct at the prevention of the industrial risks.

INTRODUCTION

Assessing and managing environmental risk in productive industrial fields [3] has been considered to some extent by Richards (1997) and Turner et al (1994). While Richards examined the commercial investment perspectives of risk, especially contamination Turner's work was from the perspective of using environmental management systems as a means of reducing exposure to the environmental risk.

The industrial risk are the followings[1]:

- industrial chronic risk (all forms of pollution which present a citizens health impact and on the environment) ;
- accidental industrial risk resulting from the presence of products or risks processes which might cause an accident involving serious immediate consequences for the staff, the citizen and the environment.

The European legislation deals with these two types of risk as a distinct:

- the chronic risk (integrated control and prevention of pollution).
- the accidental risk (the control of dangerous: fires, explosions, noise, air pollution, water, waste pollution resulting from the radioactivity[2].

The facilities of modest capacity are regarded as having low risks and they must meet the general technical requirements. The facilities of capacity more important are considered of the high risk and are therefore are the subject to the legal institutional authorization regime[4].

The Risk Management System[5,6] sets conditions for development and exploitation of the installation, analysis and measurement of the operation, the methods and means of intervention in case of accident, the emergency measures to adopt and obligations of the operator in terms of information and warning of the personnel.

RESULTS AND DISCUSSION

The general issue of the Industrial Risk Management are the followings:

- Industrial Hygiene;
- Air Sampling;
- Indoor Air Quality;
- Ergonomics;
- Chemical Safety;
- General Safety;

- Fire Safety ;
- Health Care Safety;
- Hazardous Waste Compliance ;
- Environmental Compliance;
- Environmental Audits.

1. Conventional Testing Methods
- Radiographic Examination (RT),X-Ray or Gammagraphic Testing;
- Manual Ultrasonic Testing (UT)(Pulse-echo Method);
- Surface Examination using Magnetic or Penetrate Testing.
2. Special Examinations
- Eddy Current Testing;
- Guided Wave Examination;
- Positive Material Identification(PMI), Alloy Analysis;
- Time of Flight Diffraction Examination (ToFD; Mechanized Ultrasonic Testing);
- Corroscan (Mechanized Pulseecho Examination);
- Infrared Thermograph (tracing of heat loss);
- Magnetic Flux Leakage (MFL) Tank Floor Examinations;
- Endoscopy, Videoscopy;
- On-site Hardness Measurements;
- Hydrogen Induced Cracking Examination (HIC);
- Digital radiography as on stream technique to determine remaining wall thickness;
- Hot Hydrogen Attack Examination;
- Automatic Ultrasonic Testing (AUT) of Pipeline Girth Welds.

The policy of controlling industrial risk is related with the following fields:
1. Improving the management of urbanization in the area of industries at risk ;
2. the analyses and critical review of the industrial risks studies in the general industrial field;
3. consistent risks study report ;
4. implementation of the internal Management system of security ,including the Management system for the intervention in case of accident and Professional Employees management for the risks prevention ;
5. Implementation of the periodically internal &independent audit ;
6. The feed-back implementation and information dissemination, creation of a data banks easily accessible and efficient utilizable;
7. Civil and penal responsibility of the industrial sites .

The principal elements of Risk Management System:

1. a better identification and reduction of industrial risk to the source;
2. improving the role of the human factor and particularly of employees in the prevention of accidents,
1. safety design of facilities, an important part of their maintenance procedure;
2. create a scale of risk to the assessment of industrial accidents on the whole of classified installations ;
3. lead a reflection on the necessity of products "dangerous" and the manufacturing process "at risk" ;
4. reconsider the storage conditions ;
5. develop technologies to the lower risks ;
6. develop the establishment of management systems of security and the audits of internal security.
7. Public Information: establish a permanent dialog between industrial, governments and citizens, inform the citizen to assure it's own safety, regular days "Open Doors" activities, develop a genuine culture of risk, popularize the technical information of industrial risk, popularize the studies of risks, frequently updating information brochures.

Conclusions

The Risk Management System included three parts:

1. Improving the management of urbanization in the area of industries at risk ;
2. Industrial Risks Analyses System implementation in each industrial plant;
3. Management system of security modern and efficient.

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ELECTRICAL IMPEDANCE SPECTROSCOPY AS A POSSIBLE NONDESTRUCTIVE METHOD IN QUALITY ASSESSMENT

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ABSTRACT

The magnitude and phase angle of impedance were measured with a HP 4284A LCR meter on Gala apples purchased on the local market. Two ECG electrodes (Fiab Spa) were applied on apple with skin and without skin at several places on the apple surface along the equatorial. The good electrical contact between the electrodes and apple was realized with a conducting gel. The impedance spectra were determined in frequency range from 10 Hz till 1 MHz at 1 V measuring voltage. Each measured spectrum after an open and short correction was approached by a circuit model consisting of a serial connection of impedance of apple skin and impedance of intracellular and extracellular apple flesh. The complex non-linear least squares method was applied with Mathlab program. This approaching method can allow getting the impedance of apple flesh under the skin without peeling.

INTRODUCTION

The electrical impedance spectrum - in low frequency range - of biological tissues depends on the state of cellular structure (Grimnes and Martinsen, 2000; Vozáry et al., 2007), therefore the parameters evaluated from measured spectrum can be used for quality assessment of fruits and vegetables (Vozáry et al., 2007, Harker and Maindonald, 1994). Recently there is a great demand on non-destructive investigating methods. In this work an attempt was made to determine the impedance parameters of apple tissue from the impedance spectrum measured on the whole apple with skin. The impedance spectrum measured on whole apple with skin was approached with impedance of model circuit consisting of serial resultant of apple skin impedance and apple flesh impedance. The model parameters, characterizing the apple skin and flesh were evaluated.

MATERIAL AND METHOD

Gala apples were purchased on the local market. Impedance along the equatorial (Fig.1.) was measured at two electrode arrangements on apples with and without skin. At first, the two electrodes were same distance – the diameter of the apple - far from each other: the two electrodes were at 1 and 7 point, at 2 and 8, 3 and 9, 4 and 10, 5 and 11, 6 and 12, respectively. At the second measurement one of the electrodes was at 12 point and the other electrode was placed to each point from 1 to 11.

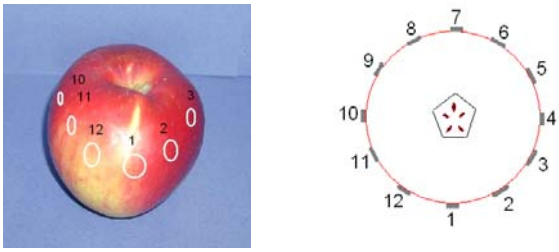

Figure 1

The places of electrodes during impedance measurement on equatorial of apple

The magnitude and the phase angle of impedance were measured with a HP 4284A LCR meter in frequency range from 10 Hz till 1 MHz at 1 V measuring voltage. The apple surface, with skin and without skin, along the equatorial was touched with two ECG electrodes (Fiab Spa). The good electrical contact between the electrodes and apple was realized with a conducting gel. Each measured spectrum after an open and short correction was approached with

impedance of an electrical model circuit consisting of a serial resultant of apple skin and apple flesh impedance.

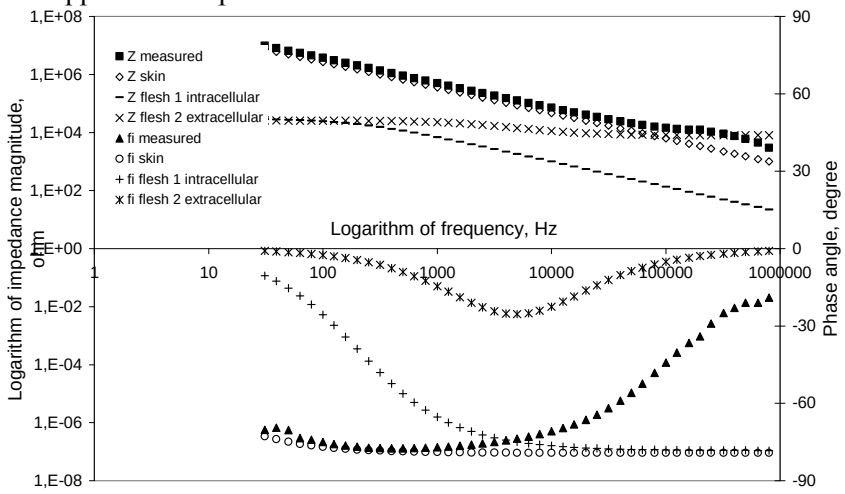

Figure 2
A typical spectrum of magnitude and phase angle of
Impedance measured on apple with skin and the result of approach.
The measured spectrum can be expressed with sum of impedance
of skin, extracellular and intracellular part of apple flesh.

$$Z = R_o + \frac{R - iR^2C\omega}{1 + R^2C^2\omega^2} + \frac{R_1}{1 + i(\tau_1\omega)^{\psi_1}} + \frac{R_2}{1 + i(\tau_2\omega)^{\psi_2}} \qquad (1)$$

The impedance of apple skin was modelled with a parallel RC circuit:

$$\frac{R - iR^2C\omega}{1 + R^2C^2\omega^2}, \qquad (2)$$

where R and C are the resistance and the capacitance of apple skin. The impedance of apple flesh was approached with serial resultant of two distributed elements corresponding to extra cellular and intracellular part of tissue:

$$\frac{R_1}{1 + i(\tau_1\omega)^{\psi_1}} + \frac{R_2}{1 + i(\tau_2\omega)^{\psi_2}}. \qquad (3)$$

The R_1 and R_2 are resistances, the distances between the two intersections of locus curves with real axis, τ_1 and τ_2 are relaxation times, and ψ_1 and ψ_2 exponents characterize the distribution of relaxation times.
R_o is the resistance of apple at high frequencies.

The complex non-linear least squares (CNLS) method was applied in curve fitting with MathLab program. The impedance parameters: the resistances, the capacitance, relaxation times, exponents were determined, too.

RESULTS AND DISCUSSION

The CNLS method can allow getting the impedance of apple flesh separately from the impedance of apple skin using the measured spectrum of whole apple with skin (Fig.2.). The impedance of apple flesh can be described well with resultant of extracellular and intracellular impedance (equation 3). Really, it is known for other living tissues, too, that the impedance of intracellular part differs from the impedance of extracellular part (Grimnes and Martinsen, 2000). For example, the impedance of nectarine fruit can be represented by such model circuit, which contains the extracellular resistance, capacitance and the intracellular resistance, capacitance, too (Harker and Maindonald, 1994).
The impedance locus curve measured on whole apple with skin gives good agreement with the approaching curve.
The value of impedance measured on apple with skin is highest, when electrodes are near to each other. On the other hand the highest impedance on apple without skin can be measured, if the electrodes are far from each other. These results can be explained by the different ratio of current length to current cross-section on the surface of apple, where the skin impedance is determinative, and inside of whole apple, in apple flesh. In the case of peeled apple the current goes through interior of apple.

CONCLUSION

The CNLS approaching method can allow getting the impedance of apple flesh under the skin without peeling.

ACKNOWLEDGEMENT

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EFFECT OF SOY FLOUR, CORN FLOUR AND GLUTEN ADDITION ON QUALITY CHARACTERISTICS OF BREADING

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Bread crumbs are typically derived from bread which have been either dried or toasted and are often used in the food industry to enhance the fried-like texture that consumers typically enjoy. In this study, soybean flour (5,10, 15%), corn flour (5,10,15%) and gluten (3,6,9%) were added to bread formulation.

Table 1. The properties of breadings formed from different particle size

	Moisture (%)		Water Binding Cap (g/g)		Oil Uptake (%)		Compressive Force (g)	
p.s.	**small**	**large**	**small**	**large**	**small**	**large**	**small**	**large**
c	7,43	7,85	3,15	3,18	20,00	34,58	3049,3	4769,5
c5	7,83	7,31	2,87	2,71	31,01	19,67	3085,5	5211
c10	8,22	8,21	2,81	2,85	33,15	18,58	3004	4756
c15	8,04	7,83	2,64	2,64	28,79	18,51	3296,5	4543,5
s5	7,23	7,18	2,83	2,87	28,83	32,64	3243,8	3573
s10	7,24	7,7	2,82	2,69	26,66	32,6	3312	3850
s15	7,60	7,85	2,74	2,56	31,66	33,76	5140	6264,5
g3	7,14	7,16	3,17	3,08	16,23	26,09	1872,4	2979
g6	6,69	6,89	3,25	3,10	16,20	28,71	1655,1	2027,7
g9	7,29	7,42	3,45	3,13	16,15	27,51	1984,5	2198,4
LSD	**0,76**	**0,76**	**0,17**	**0,2**	**9,29**	**9,29**	**373,2**	**373,2**

Table 1 continued

	Color After Frying					
	L		a		b	
p.s.	**small**	**large**	**small**	**large**	**small**	**large**
c	68,54	67,51	2,89	3,21	34,53	34,56
c5	69,11	63,11	4,61	7,41	36,62	38,22
c10	66,73	70,63	4,99	2,45	38,8	37,12
c15	71,08	66,18	2,28	4,36	35,7	37,12
s5	61,92	60,25	6,65	10,75	39,87	39,95
s10	63.00	60,01	5,43	9,20	37,91	38,16
s15	60,39	62,66	9,48	7,99	39,86	37,99
g3	61,10	60,6	6,04	5,83	35,98	35,69
g6	63,56	61,33	5,15	6,87	35,5	34,96
g9	70,94	66,51	4,38	4,53	36,95	37,67
LSD	**1,69**	**1,69**	**1,26**	**1,26**	**3,08**	**3,08**

p.s: particle size, c: control, c5: 5%corn flour, c10: 10% corn flour, c15: 15% corn flour, s5: 5% soy flour, s10: 10% soy flour, s15: 15% soy flour, g3: 3% gluten, g6: 6% gluten, g9: 9% gluten, LSD: Least Significant Difference

Effect of soybean flour, corn flour and gluten on quality characteristics of dried bread crumb were evaluated. Moisture, protein, color, water binding capacity, oil absorption, and compressive force of dried bread crumbs were determined. Addition of gluten increased water binding capacity especially for 6% and 9% levels. On the other hand, both corn and soy flour addition decreased water binding capacity in each particle size in comparison with control sample. Gluten added breading absorbed less oil than corn and soy flour added breadings. 15% soy flour addition considerably increased compressive force while gluten addition reasonably decreased the compressive force as compared with control sample ($p<0.0001$).

PRELIMINARY RESULTS FOR CONTENT OF NATURAL AND ARTIFICIAL RADIONUCLIDES IN SOME MARINE OBJECTS FROM BLACK SEA COAST

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The studies related to radioactive pollution and behavior of natural and man-made radionuclides in Black-sea water basin are rather limited and give no complete picture of the radioecological status of the region. There is lack of systematic data concerning their physical and chemical peculiarities as well as their concentration levels in bottom sediments, algae, mussel, fish, sea snails and other Black sea marine organisms.
That is why results from preliminary research of natural and artificial radionuclides in mussels, rapa whelk, algae, fish and so from the Bulgarian Black sea coastline are presented in this paper. The technogenic ceasium-137 together with the natural uranium-238, bismuth-214 and potassium-40 are determined. The isotopes of uranium are determined by both gamma-spectrometry and alpha-spectrometry after radiochemical procedure for purification and concentration.

Table 1
Results of gamma-specrtometry analyses of samples from Black sea (2004-2005) [Bq/kg]

Sampling place	**Sample type**	**Cs-137**	**U-238**	**Bi-214**	**Ac-228**	**K-40**
1. Varna – fishing beach (2004)	*Mytilus galloprovincialis*	3 ± 2	7 ± 4	17 ± 4	15 ± 5	98 ± 10
2. Varna – fishing beach, (2004)	*Mytilus gallop.*- shells	< 1	4 ± 3	2 ± 1	< 2	< 50
3. Galata – 6 miles to the east (2004)	*Mytilus galloprovincialis*	2±0,5	5 ± 2	3 ± 1	4 ± 2	30 ± 5
4. Kaliakra (2004)	*Mytilus galloprovincialis*	2±0,5	6 ± 4	7 ± 2	3 ± 2	< 50
5. Galata – 6 miles to the east (2004)	*Anadara inaequivalvis*	< 1	6 ± 3	< 1	4 ± 2	< 50
6. Galata – 6 miles to the east (2004)	*Rapana venosa*	10±2	5 ± 3	< 1	< 2	70 ± 5
7. Varna – fishing beach (2005)	*Chlorophyta*	2±0,5	6 ± 2	3 ± 1	3 ± 1	210 ± 10

Table 1 continued

Sampling place	Sample type	Cs-137	U-238	Bi-214	Ac-228	K-40
8. Varna – beach coast (2005)	*Algae*	2±0,5	7 ± 2	8 ± 2	7 ± 2	270 ± 10
9. Arkutino (2005)	*Brown Algae*	2±0,5	< 5	3 ± 2	7 ± 3	30 ± 3
10. Arkutino (2005)	*Chlorophyta*	<1	< 5	3 ± 2	< 2	20 ± 2
11. Sinemoretz (2005)	*Chlorophyta*	< 1	< 5	< 1	< 2	40 ± 4
12. Arapja (2005)	*Chlorophyta*	< 1	< 5	< 1	4 ± 1	100 ± 10

Table 2
Results of gamma-specrtometry analyses of samples from Black sea (2006) [Bq/kg]

Sampling place	Sample type	Cs-137	U-238	Bi-214
Galata	*Rapana venosa*	< 1	< 3	1 ± 0,5
Galata	*Rapana venosa* (shells)	4 ± 2	4 ± 2	3 ± 1
.Galata	*Mytilus galloprovincialis*	2 ± 1	7 ± 3	5 ± 2
.Galata	*Mytilus galloprovincialis* (shells)	0,3 ± 0,2	4 ± 1	1 ± 0,5
Galata	*Anadara inaequivalvis*	1,2 ± 0,5	7 ± 3	5 ± 1
Galata	*Anadara inaequivalvis* (shells)	0,4 ± 0,2	5 ± 1	2,5 ± 0.5

Sampling place	Sample type	Ac-228	K-40
Galata	*Rapana venosa*	< 2	50 ± 5
Galata	*Rapana venosa* (shells)	3 ± 2	73 ± 7
.Galata	*Mytilus galloprovincialis*	4 ± 2	160 ± 30
.Galata	*Mytilus galloprovincialis* shells)	1,2 ± 0,5	30 ± 6
Galata	*Anadara inaequivalvis*	3 ± 2	40 ± 5
Galata	*Anadara inaequivalvis* (shells)	2,3 ± 0,5	20 ± 2

Table 3
Results of alpha-specrtometry analyses of samples from Black sea (2004) [Bq/kg]

Sampling place	Sample type	U-234	U-235
Galata – 6 miles to the east	*Mytilus galloprovincialis*	6 ± 1	0,4 ± 0,1
Kaliakra	*Mytilus galloprovincialis*	7 ± 1	0,5 ± 0,1
Varna – fishing beach	*Chlorophyta*	7 ± 1	0,4 ± 0,1
Galata	*Rapana venosa*	1 ± 0,2	< 0,1

Sampling place	Sample type	U-238
Galata – 6 miles to the east	*Mytilus galloprovincialis*	4 ± 1
Kaliakra	*Mytilus galloprovincialis*	5 ± 1
Varna – fishing beach	*Chlorophyta*	5 ± 1
Galata	*Rapana venosa*	1,4 ± 0,2

DISTRIBUTION OF ^{3}H IN OBJECTS FROM BR "SREBARNA" AND SURFACE WATERS FROM NORTH AND SOUTH BULGARIA

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ABSTRACT

By reason of the big radiation-hygienic significance of tritium for the individual its specific activity is determined in soils, plants (agricultural and aquatic) and water from BR"Srebarna" and surface waters from North and South Bulgaria. The determined levels of specific activity are low, due to global cycling tritium, and show the lack of local tritium contamination.

INTRODUCTION

The tritium in the environment is produced by the interaction of cosmic rays with nucleus of chemical elements in the atmosphere, the nuclear bomb test, the operation of nuclear reactors and nuclear fuel reprocessing plants. Tritium is one of the more important radionuclides for doze assessment, characterizing and determining the radiation situation in the regions around nuclear fuel cycle

industries. As an isotope of hydrogen, the tritium is includes in many organic compounds, as well as in genetic-information macromolecules. The beta-decay of tritium leads to disrupt of the molecular structure and the intermolecular connection by effect of ionizing radiation of beta-particles as well as the transformation of tritium to isotope of helium.
By these reasons, the investigation of specifics of the behaviour of tritium in the environment and the pathways for incoming in human organisms is an important purpose, as well as his high migration mobility motivates the necessity of long-term dynamic monitoring.
The purpose of this paper is investigation of the distribution of "free" tritium in elements of ecosystem of the Biospheric reserve "Srebarna" and surface water from North and South Bulgaria.

MATERIAL AND METHODS

The specific activity of tritium in elements of ecosystem of the Biospheric reserve "Srebarna" and his restricted area was determined in period 1998-2000 years. Twice annual (in spring and autumn) was performed sampling for analysis water, water growing plants, /wodna tchuma (*Egeria densa)*, wodna leshta (Lemna minor), drebna mehurka (*Ultricularia vulgaris)* and rogolistnik (*Ceratophyllum demersum)/*, soil, agriculture plants and products (wheat, maize, sunflower, bean, potatoes and lucerne), virgin-soil grass and reed *(*Phragmites astralis). In the next years, single samples of surface water from Northern and Southern Bulgaria have been taken.
The specific activity of tritium in biological material and soil was determinate as free water, obtained from low-temperature vacuum distillation; water samples were distilled after filtration by routine procedure. The next step of sample preparation for tritium analysis includes electrolysis isotope enrichment, with mean isotope enrichment factor (6.25 ± 0.35) for the system applied.
The activity of tritium in enriched samples was determinate on LCC Beckman LS 9800 with liquid scintillation cocktail Ultima Gold LLT (8 ml enriched water+10 ml cocktail) and time of measurement for each sample 500 min (5 cycles, each 5x20 min). The results obtained for specific activity of tritium was presents in Bq/l for all objects in this investigation.

RESULTS AND DISCUSSION

The annual mean specific activity of "free" tritium in soil and plants from region of the reserve "Srebarna" is between 3÷6 Bg/l for the 3 years of investigation (Table 1).

Table 1
The annual mean specific activity of ^{3}H (Bq/l water) in soil, agriculture plants and products, grass, water and water plants.

Sample	Site of sampling	1998 г	1999 г	2000 г
Soil, 0 – 10 cm	Southern lock	3 ± 1	5 ± 1	4 ± 1
Soil, 0 – 10 cm	Fazanarija	4 ± 1	4 ± 1	5 ± 2
Soil, 0 – 10 cm	Northern lock	4 ± 2	5 ± 2	4 ± 2
Maize, plants	Northern lock	4 ± 2	4 ± 2	4 ± 2
Maize, seed-grains	Northern lock	6 ± 2	4 ± 2	5 ± 2
Sunflower, plants	Northern lock	3 ± 1	3 ± 2	5 ± 2
Sunflower, seed-grains	Northern lock	4 ± 1	5 ± 2	4 ± 1
Wheat, plants	Northern lock	4 ± 2	3 ± 1	3 ± 1
Wheat, seed-grains	Northern lock	4 ± 1	4 ± 1	5 ± 2
Bean, seed-grains	West from museum	3 ± 1	3 ± 1	4 ± 2
Potatos, klubeni	West from museum	4 ± 1	3 ± 1	4 ± 2
Lucerne, plants	Northern lock	3 ± 1	5 ± 2	4 ± 1
Lucerne, plants	Southern lock	3 ± 1	4 ± 2	3 ± 2
Lucerne, plants	Fazanarija	4 ± 2	3 ± 2	4 ± 1
Grass, mixed	Northern lock	5 ± 2	4 ± 1	4 ± 2
Grass, mixed	Southern lock	3 ± 1	4 ± 2	3 ± 1
Reed	Southern lock	4 ± 2	3 ± 1	3 ± 2
Water	Northern lock	3 ± 1	4 ± 2	5 ± 1
Water	Southern lock	3 ± 1	4 ± 2	4 ± 2
Wodna tchuma	Southern lock	3 ± 2	3 ± 2	4 ± 1
Wodna leshta	Southern lock	3 ± 1	3 ± 1	4 ± 1
Mehurka	Southern lock	3 ± 1	4 ± 1	4 ± 2
Rogolistnik	Southern lock	3 ± 2	5 ± 2	5 ± 1

The lack of significant difference in concentration of the isotope between soil and plant may be connected with specifics of the behaviour and incoming. The tritium absorbed in soil as HTO following the same transport mechanism as normal water, distributes in soil profile and is accumulate from the plants. Besides the roots, the plants assimilates tritium from atmospheric moisture by surface of the leafs.
Simultaneously one significant part of soil HTO returns back to the atmosphere by evaporation from soil and leafs of the plants [Brudenell et al., 1997; Choi et al., 2005, 2007]. In the case of normal emission of tritium from generating sources between these processes is establish dynamic equilibrium, following to equal tritium concentration between in soil water, surface air and plants [Peterson, S., et al., 2000].

We did not specify differences in specific activity of tritium in water content of the different kinds of agriculture plants and between vegetative parts of plants (leafs and stems) and reproductive parts as seed-grains. Such a difference is establish after correction of specific activities with water content in these organs. In this case the tritium content in the seed-grains is in such order lower than in stems and leafs.

The results obtained for specific activity of ^{3}H in water from the lake and water plants (Table 1) confirms established relation [Murphy, 1984, 1993], that free water tritium in water plants is the same in the water.

In investigated water samples from Danube river (Kozloduj, Oriahovo, Belene, Svishtov and Silistra) the specific activity of ^{3}H vary from below the minimum detectable activity of the analyses (MDC=2.2 Bq/l) to 4.4 Bq/l. A comparison between the annual mean specific activity of HTO in Danube river for period 1998-2000 years (Table 1, Northern lock) with these for 2004-2007 year shows no difference between these data. An exception is only for warm channel of NPP "Kozloduj" in 2006 year - twice higher concentration of 9.0 Bq/l HTO.

Our results coincides with the data from [Villa and Manjon, 2004], who in water samples from Danube river, taken before outflow of the warm channel of NPP "Kozloduj (2003 year) determine specific activity of tritium 1.7–3.0 Bq/l, and from the warm channel–10.7 Bq/l.

The measurements of specific activity of tritium in surface water from other sites in Northern Bulgaria almost were below MDC and no significant dynamics was assessed. The same concentrations and dynamics were assessed in surface water from Southern Bulgaria, all results were below MDC with the only exception-water from Smolian lakes for 2004 year.

Conclusions

The results obtained shows that the level of tritium in elements of ekosystem of BR"Srebarna" and surface waters from Northern and Southern Bulgaria are in the limits of the typical tritium concentration for Central Europe and at this stage of investigation any tritium contamination in Bulgarian was not assessed.

The estimated annual mean specific activity of tritium is near to the average values in the environment, typical in the recent years for this globally dispersed radionuclide.

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