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Monitoring Of The Mosquitoes In Skopje 2016 And Impact Of Flood In Municipality Gazi Baba Of The Mosquitoes Populations

Nikolina Sokolovska[1], Liljana Lazarevska[2], Zlatko Arsenievski[3]

[1]nikolinasokolovska@gmail.com, [2] liljanalazarevska@gmail.com, [3]arsenievski@yahoo.com

P.H.O.Center for public health-Skopje

ABSTRACT

In Republic of Macedonia malaria has been eradicated in 1973.Since then control of mosquitoes is a regular measure.In 2010, WHO initiated the re-analysis of the mosquitoes in the territory of the Republic of Macedonia.Today, monitoring of the mosquitoes is providing only in Skopje by team from P.H.O Center for public health – Skopje.

Collecting adults of mosquitoes for qualitatively and quantitatively prooving we has been used BG Sentinel traps.There were three traps, one trap in peri-urban area and two traps in urban areas.They were placed for six months and changed the nets every two weeks.Samples were returned in Entomological laboratory in P.H.O.-Skopje.

Monitoring has been started in april, when temerature is enlarge and populations of mosquitoes are increases.Traping adults of the mosquitoes in august in peri-urban area Gazi Baba, period of flood, are proof for proportionally increase temerature, humidity and mosquitoes.

There were interest results from entomological research on territory of Skopje, our idea is to expand the monitoring all over territory of the Republic of Macedonia.When we have information of species composition of mosquitoes in Macedonia, than we will choose the best way for their control and stop appearance and spreading the patogents.

Keywords: ***adults,mosquitoes,monitoring,flood,BG Sentinel***

INTRODUCTION

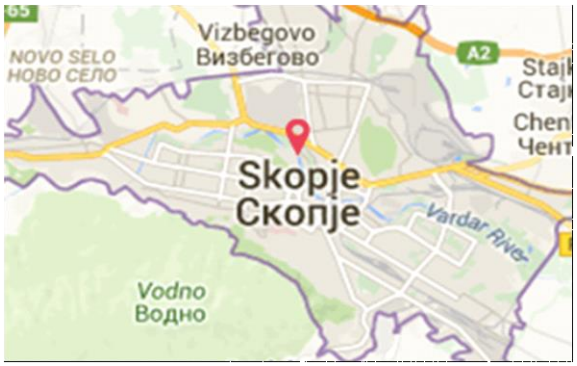
In the last century, malaria was spread with an epidemic character. It was also included in the Republic of Macedonia. In addition, W.H.O. developed a plan and program for eradicating the disease and putting it under control and providing financial resources and specialized personnel.

Long was the period when the mosquitoes and pathogens that they transmitted were controlled (the Plasmodium parasite).In the period of eradication of malaria, in addition to the control and surveillance of mosquitoes, data were obtained on their qualitative composition in the Republic of Macedonia.Later, the Ministry of Health of the Republic of Macedonia prepared the Annual National Public Health Program, where one of the measures is vector control with an emphasis on mosquitoes that are transmitters of several infectious diseases (Malaria,

Chikungunya, Dengue, West Nile fever, Yellow fever, Filariasis).

Monitoring of mosquitoes was one of the most important measures in the surveillance and control of mosquitoes. After eradication of malaria there was no serious approach in terms of monitoring. On several occasions the quantitative composition was controled.In 2010 again with financial resources from W.H.O. in cooperation with the Macedonian Ecological Society, a research was carried out on the territory of the Republic of Macedonia to prove the presence of a tiger mosquito (Aedes albopictus). Since 2013, the implementation of the monitoring is only in the City of Skopje by the professional services of the Disinfection, Disinsection and Pest Control Service of the Center for Public Health – Skopje.

The city of Skopje is spread over 1818 km2, 23 km in length and 9 km in width and is located at an altitude of 245 meters below sea level. Average annual temperature is 13,5o56oF. Average fog days - 74,1 days. Rainfall - average per year 940mm / 11 days. Longitude and latitude of Skopje 21.4279956; 41.9973462.



Picture.1 Map city of Skopje (*source: Google map)*

MATERIALS AND METHOD

Since when the 2013 monitoring started the mosquitoes BG-Sentinel are used by the mosquitoes in Skopje, and as an attractive we has used gas CO2.

In 2016, 3 (three) traps were placed in 3 (three) carefully selected locations in the City of Skopje. When choosing locations, our goal was to cover the city's central and peripheral area (urban and peri-urban).

The first location was a private house in the village of Sengelic in a peri-urban environment that belongs to the municipality of Gazi Baba. This territory of the City of Skopje has a great contribution to the number of mosquitoes due to the numerous irrigation canals of the agricultural areas, the developed livestock breeding and its border with the mountain Skopska Crna Gora.

The second location was in the City Park, the Central City area. In addition to the variegated vegetation, low-pitched and high-altitude, the Zoo is also nearby, which has its own contribution to the population of mosquitoes, because it is a central city area and the frequency of the population is high.

The third location was in the Disinfection, Disinfection and Pest Control which falls

under the territory of the municipality of Cair, an urban environment with numerous parks, fountains and several kilometers away are the City Cemetery.

The traps were set up from 15.4.2016 until 20.10.2016. It is a period of 6 (six) months and networks with trapped adults were changed every 2 (two) weeks.

Picture.2 trap BG Sentinel (Source.Google)

Picture.3 net with mosquitoes (source.Google)

The samples were returned to the Entomological Laboratory in the Disinfection, Disinfection and Pest Control at P.H.O. Center for Public Health - Skopje, where triage and morphological-taxonomic determination of mosquitoes with binocular was performed.

In 2016, on August 6, there was a temporary natural disaster of heavy rainfall on the territory of the City of Skopje with a special intensity of precipitation in settlements belonging to the municipality of Gazi Baba (where the trap was placed), exactly, Singelic, Stajkovci, Indjikovo , Creshevo, Economy, Smilkovtsi, Kamenik, Stracinci.

In the flooded region, 93 liters of rain were flooded in 24 hours, and over the first 2 hours there were over 800 thunderstorms. More than 1,500 people were evacuated, but unfortunately there were 25 victims.

Picture.4 Municipality Gazi Baba (Source Google map)

Picture.5 Municipality Gazi Baba (source Google map)

Picture.6 Flooded area (source Goole map)

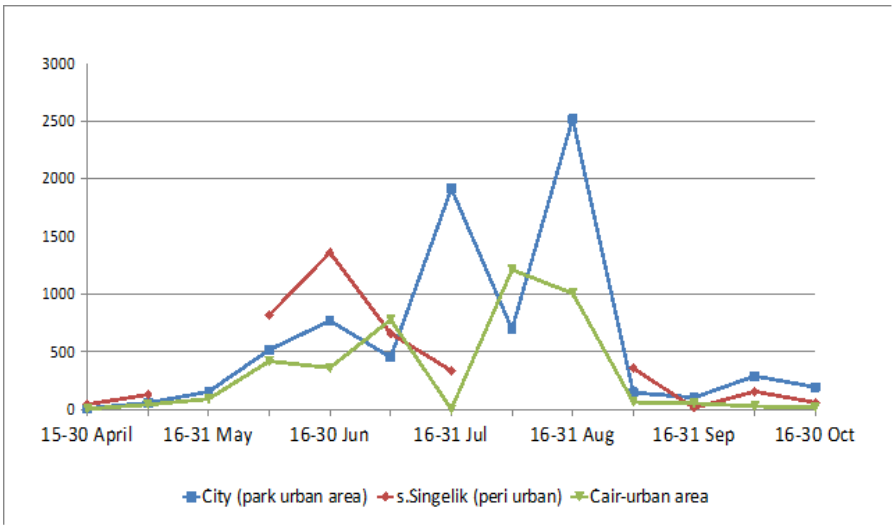
RESULTS

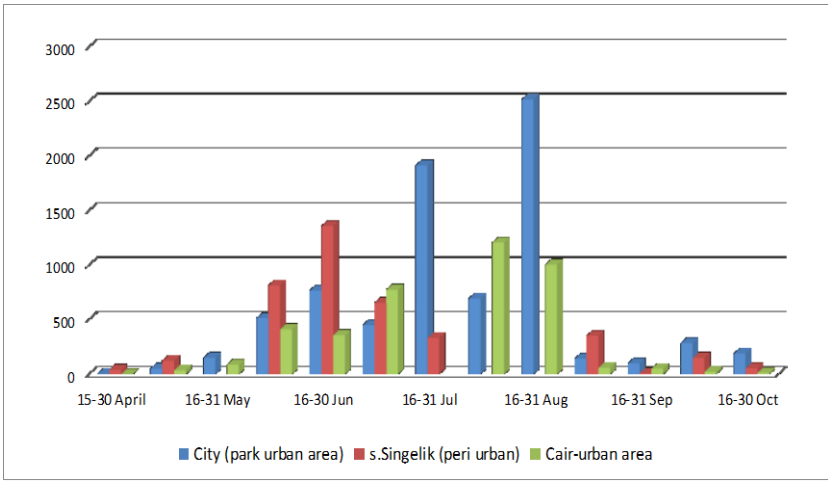
The results of the monitoring of mosquitoes for 2016 in Skopje are presented in a table and graphic. It can be noted that in April, when the daily temperature exceeds 10^0C , it is the first flight of adult mosquitoes. As temperatures increase and their development cycle accelerates, and of course their number.

The number of population of mosquitoes in 2016, before and after a flood in Skopje and municipality Gazi Baba can be seen in the table and graph.

Table 1.Collected adult mosquitoes by provided monitoring in Skopje 2016

2016	15-30April	1-15May	16-31May	1-15jun	16-30Jun	1-15Jul	16-31Jul	1-15Aug	16-31Aug	1-15Sep	16-31Sep	1-15Oct	16-30Oct
City (park urban area)	7	54	152	515	768	450	1914	695	2520	144	101	287	192
s.Singelik (peri urban)	41	126	/no electric	815	1360	657	334	54 no electric	3710 after flood	354	11	153	
Cair-urban area	3	39	89	416	360	776	0	1209	1005	61	51	25	15





Regarding the places where the traps are placed, it is also seen that in the peri-urban environment the number is higher than in the urban environment.This is due to the different economic development, the demographic characteristics, the culture, the socio-economic condition, agricultural and livestock development, the presence or absence of artifical vessels, landfills and less standing water surfaces (well developed atmospheric sewage system).

So far, the positive influence of the temperature on the quantitative composition of mosquitoes has been elaborated, but humidity also has a major influence on their development. This is confirmed by the results obtained from the flooded region.Their number is more than ten times increased. Regarding the qualitative composition in the flood period, the most dominant species of the fam.Culicidae was the species Culex pipiens of 3710 trapped alulties. 76% belonged to the species Culex pipiens, 10% Culex modestus, 5% Culex mimeticus, 4% of the species Uranotenia longiareolata, 5% of the species Culiseta annulata.

CONCLUSION

From the health - epidemiological interest is the implementation of the monitoring of mosquitoes and therefore we will continue in the following years with the same dynamics. The recognition of the quantitative composition of mosquitoes is a mitigating circumstance in their control and the possibility of transmitting pathogens.

Knowing the fact that the increased moisture and temperature is proportional to the number of mosquitoes, and thus increases the possibility of occurrence of infectious diseases transmitted by mosquitoes, it is necessary to introduce an Early warning system for better control of mosquitoes. This system will increase the health care of the population.

This would be accomplished by continuous cooperation with the Hydrometeorological Institute of the Republic of Macedonia. Which would not inform about the changes in the weather conditions for possible rainfall. This is a timely response to the Disinfection, Disinfection and Pest Control and timely prevention of epidemics.

LITERATURE

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Baker`s Yeast Shelf Life Preservation in Presence of Alginates

Aleksandar Anastasovski

AleksandarA@t.mk

International Balkan University, Faculty of Engineering – Skopje, North Macedonia

ABSTRACT

Food products are very sensitive to environmental conditions. That is especially high in a case of Baker`s yeast. Compressed (fresh) Baker`s yeast is actually microorganism`s strain Saccharomyces cerevisiae. It is unstable at temperatures above 4ºC. The reason is budding of cells. If that is the case, yeast cells use stored components for feed. After the complete usage of energy components, cells make autolysis. Autolysis is a process at which cell is going to destroy itself. Cytoplasmic juice goes out of the cell membrane and fills intercellular space. The juice is full with water and components useful for other microorganisms. These conditions make ideal environment for growing other microorganisms and decreasing Baker`s yeast shelf life. The change of water content in the product can change its shelf life. There are food additives able to absorb water. They could be used for protecting the product with water absorbing. Two types of additives (alginates) with high water absorption capacity were observed in use added to compressed yeast. Different concentration of Sodium- and potassium alginates were used in preparation samples of yeast. Based on analysis of few product`s parameters, the samples with 0.2% alginate showed the best results in preservation. Increasing of alginate concentration, increase yeast stability, but decrease water solubility. Using of alginates can increase stability of Baker`s yeast quality.

Keywords: ***alginates; K-alginate; Na-alginate; compressed yeast; shelf life***

INTRODUCTION

The food product`s shelf life is one of the main issues for chemical engineers involved in food industry. The stability of food product`s quality depends on many factors. One of the basic factors is its content. Food products those are made by non-living organisms could easier keep their quality. But, products that contain living organisms and their cell vitality have to be kept, need special care in storage and transport. That kind of product is Baker`s yeast. The Baker`s yeast as food product for bread making has few forms. It could be produced as yeast cream, fresh or compressed yeast and active dry yeast. This research was made on compressed Baker`s yeast. Many factors could affect on changing of compressed yeast stability. Producers try to increase it for the longer period. The main strategy is to detect factors for spoiling and to stop or reduce them. There are many factors involved in keeping of fermentation activity and yeast consistency. All those factors are

relating to whole process of production, since fermentation to packaging and storage. Fermentation process is very important. Nutrition for yeast fermentation and its last stage have a great role for better shelf life of compressed yeast. Added molasses and feeding salts are a reason for different chemical content of final compressed yeast, high quantity of enzymes, proteins as well as quantity of stored reserve sugars. Fermentation feeds can have impurities. Those impurities could have inhibiting characteristics. They are different chemical compounds, solid particles (decreasing OTR) and microorganisms. The stage of maturation is have producing older cells that store sugars as reserve for case of starvation [1]. Yuan and Bellgardt [2] give new strategy in fermentation feeding. That strategy makes higher storage stability of compressed yeast and leavening activity. The next stage, separation stage can also change yeast stability. It is well known that higher dry matter content can increase longevity of compressed yeast. So, filtration as a separation process increase dry matters by use of reverse (salt) osmosis [3, 4]. There is another process used for conservation of fermentation activity of yeast - drying [5]. Active dry yeast has very high fermentation stability for more than six months. If all those factors are removed, there is higher possibility for compressed yeast to be stable. Fermentation activity stabilization is relating with its possibilities for bread dough volume increasing. That parameter is taken to be quality control method [6]. Few phenomena are evident in storage of compressed yeast. Increasing of water content is expressed in almost all cases. There are few reasons for that. That is coming from higher level of NaCl content, autolysis of yeast cells, and bacterial contamination of compressed yeast as a product. The speed of spoiling is increasing with increasing of water content. It's well known that microorganism activity depends on water activity. Water activity represents the ratio of the vapor pressure of an aqueous solution to the vapor pressure of the gas dissolved in water. Lower values of water activity inhibit microorganism's activity. That is the same for contaminant microorganisms and for yeast. In such as case yeast cells are starting to bud on autolyzed yeast cells.

Scientists used different additives or processes to make Baker`s yeast stable. Salt osmosis is the oldest and the most used. There is also process for pre-filtration yeast treatment with acid. Acidifying is decreasing pH between 0.9 to 2.0. After that, acid is neutralized and yeast cream goes to filtration. This process makes yeast more stable and keeps fermentation activity for longer time [7]. Cerutti et al. report changing of yeast stability based on different types of drying. They dried yeast with vacuum drying and freeze drying process. Vacuum drying process give the more stable product [8]. Some scientist work on genetics of yeast strains. With change of some genes, yeast could get better characteristics. Duenas-Sanchez et al. [9] mention that improvement of yeast characteristics like fermentation activity and stability depend on some genes of Saccharomyces cerevisiae. Randez – Gill et al. [10] report about new strains of Baker`s yeasts that have increased stability and new characteristics related to feeding materials and its production of carbon dioxide. Those yeast strains are made with recombination of DNA.

This paper focuses on using alginates to prevent yeast stability of shelf-life and its fermentation activity for longer time. Alginates provide lower water content, and they have characteristics to absorb free water in surrounding. With adding of different quantities and types of alginates as food additives, stability is changed as well as food product characteristics.

2. MATERIALS AND METHODS

2.1. Compressed Yeast Characteristics

Baker`s yeast represents microorganism that is reproduced with budding of cells. So, it is a product of fermentations. Aerated fermentations generate yeast biomass on fermentation media. Fermentation media must contain fermentable sugars such as sucrose or glucose, as well as minerals and vitamins that are vital for yeast feeding and growing. Baker`s yeast is separated cells of Saccharomyces cerevisiae with 30 – 34 % mass of dry matter. They are separated from yeast cream by using vacuum filtration. After their separation, they are packed in biomass bricks as compressed yeast. Average composition of compressed yeast is shown on table 1.

Table 1. Average composition of compressed yeast

Component	%mass
Water	66 – 70
Proteins (total)	42 – 48 (on 100% dry matter K_{100})
Fat	1 (on 100% dry matter K_{100})
Sugars	29 (on 100% dry matter K_{100})
Phosphorus (as P_2O_5)	2 (on 100% dry matter K_{100})
Nitrogen (Kjeldahl)	6.72 – 7.68 (on 100% dry matter K_{100})

Compressed yeast quality may be defined in many ways. There are two main properties in focus of its quality: product stability and baking characteristics. Storage and production process can have considerable influence on its quality. Production process has influence in quality because it determines protein content, reserve sugar accumulation in cells, purity of product (salts and microorganism content) as well as ageing of yeast cells. Storage has influence because of storage parameters like temperature, time of storage, etc. Yeast cells are active at higher temperatures, so cooling, keep them in some latent conditions. The best temperature of storage is determined to be around 4 ^{o}C. Freezing destroys some percent of cells, so that decrease yeast quality. The main purpose of this research is keeping yeast quality stable at higher temperatures than 4 ^{o}C. Yeast cell`s biochemical processes are going to be more active at higher temperatures until cells are live. That activity is supported with using reserve quantities of sugar (yeast glycogen and trehalose). Those reserve sugar materials are accumulated at the end of fermentation, in case when yeast cells going to be mature and have lower content of proteins. Young cells don`t have enough time to accumulate reserve sugars and contain high level of proteins. Great parts of those proteins are enzymes. That makes cells unstable. After finishing of all reserves, cells are starting to die during the

process of cell autolysis. Cell autolysis destroys cell membranes, and its protoplasm content is going outside. In case when the product contains the high number of young cells, product is unstable and have a faster process of its cell`s autolysis. Yeast cell protoplasm is rich with minerals, vitamins and components that are good food supplements for different microorganisms. That new conditions initiate other yeast cells, and another present microorganism strains to start to grow with using this cell juice. That increase number of microorganisms per product. Water content in cell`s environment is increasing too. Increasing number of bacteria and water content are reasons for activity of cells and short compressed yeast product`s shelf life. That is the reason to find some method to keep water content in lower quantity as well as possible and to make compressed yeast more stable as a final – compressed yeast.

2.2. Alginates (Composition and Use)

Some liquid food products is good to increase their viscosity for better quality. Materials like peptides, alginates and other, change liquid viscosity. This process is based on different physical and chemical changes in additives. Alginates have specific characteristics to absorb great quantities of water. That absorption of water change characteristics of food. There is a group of natural polysaccharides that are called superabsorbent. That means some of them can absorb the quantity of water 420 times more than its own weight. Alginates are part of that group. Chemically, they are linear polysaccharides, extracted from red-brown seaweed. It contains the repeated units of 1,4 – linked α-L-guluronic acid and β-D-mannuronic acid. Mixing some component with calcium create alginate hydro gels (McHugh, 1987). This group is divided to alginic acid, alginate salts and propylene glycol alginates. Their absorption characteristic is used for many purposes in food-processing industry. Alginic acid is water insoluble and rapidly swell in the presence of water. It represents white powder with no odor or taste. Alginate salts react with multivalent cations. Hydrates could be formed in cold or hot water and form thermally irreversible gels. Alginates are film formers and are stable on pH range 4-10. Propylene-glycol alginates form hydrates in cold or hot water, react with calcium ions, surface active component and reduce anionic character. These compounds could be found in granular or fibrous particle morphology in different mash sizes. 1% mass solution of alginates could have viscosity between 4 – 1300 cP.

For this research is used sodium alginate – alginate A and potassium alginate – alginate B. Their characteristics are shown in table 2. Alginate A has high viscosity at 1% mass solution. It has characteristics for gelation, suspension, thickening and binding. It is used for creation heat stable strong gels, dessert gels, structured foods (fruit, meat, fish, and vegetables) and pet food. Alginate B has also high viscosity at 1% mass solution. It has characteristics for gelation, suspension, thickening and binding. It is used for dietetic and low sodium foods as well as dry mixes.

Table 2. Chemical and physical characteristics of alginate A and B

Parameters	Alginate A	Alginate B
Viscosity (1% sol.) [cP]	250 – 550	200 – 400
pH (1% sol.)	6.0 – 8.0	
Loss on drying	Not more than 13%	No more than 12%
Particle size (100 mesh)	At least 95%	At least 95%
(150 mesh)	At least 85%	At least 85%
Colour	Not less than 54	Not less than 48
Pb	Not greater than 5 ppm	
As	Not greater than 3 ppm	
Heavy metals (total)	Not greater than 20 ppm	
Bacteria	Not greater than 5000 unit/g	
Yeasts	Not greater than 200 unit/g	
Moulds	Not greater than 200 unit/g	
Coliformn	Negative	Negative
E. coli	Not present in 25 g sample	Not present in 25 g sample
Salmonella	Not present in 25 g sample	Not present in 25 g sample
Staphylococcus aureus	Not present in 1 g sample	
Pseudomonas aeruginosa	Not present in 1 g sample	
Yeast and moulds		Not greater than 300 unit/g
Mesophilic aerobic count		Not greater than 5000 unit/g
Ash		18 – 27%

2.3. Preparing of Samples and Examination Methods

In this study is used specific characteristics of alginates as super absorbers. pH value of yeast is around 4.5, as well as alginates are forming gels in that pH range. Some yeast cells are going to autolysis in bad storage conditions or long time storage. Autolysis increases water content and gives higher possibilities for microorganism's growth. It was assumed that the presence of alginates will absorb water in compressed yeast. That process of absorption will stop microorganism`s activity and will keep compressed yeast quality for longer time.

2.3.1. Preparing of samples

The main idea is preparing a mixture of certain quantities of alginate with compressed yeast biomass. Those samples need to be packed as ordinary compressed yeast and stored. Packed samples of yeast biomass are with the same characteristics and brick's dimensions as regular packed compressed yeast bricks for sell. Samples are taken from the same batch. That means, yeast has the same characteristics for all observed samples. Those compressed yeast bricks have characteristics close to each other. One brick didn`t contain alginate additive, and that is used as the referent sample. Referent sample was exposed to the same