

Analytical results of optimum conditions of canned capers production

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Abstract. *Caper is medicinal herb. Its canned products with dietary ingredients which processed burgeons, fruit and canned foods are used to treat various diseases. Combination canning reduced moisture content in caper fruit by 14%, 25%, 35% and 75% then the effectiveness of canning by adding salt to it is learned. Theoretical and practical results of the work are summarized. The optimal variant of a new type of canned non-traditional caper was designated.*

Key words: *native, sour, destructive, clostridium, sterilization, optimum, vegetative phytoncides, inactivation, buds, stachidrin, glycoside.*

Introduction. The canning industry is conducting research on the use of non-traditional raw materials in the production of medicinal and dietary products, the creation of new ingredients and modern technologies. The field focuses on the creation of canned products based on the dietary component of plants that contain components with special properties, including *Capparis Spinosa L.* (capers). In this regard, research is being conducted to create and apply new technologies in production, to obtain high quality products, to focus on measures to preserve and increase the biological richness of products, the efficient use of natural raw materials and products. This non-traditional raw material, which we have chosen, serves not only its medicinal properties, but also its economic efficiency. In addition, the biological and chemical properties of capers allow it to produce a variety of medicinal and dietary products in the canning industry. *Capparis Spinoza* contains 27 mg of iodine and various vitamins (A, E, C), which can be used in the manufacture of medicinal, exported canned food, fruit peels and capsule powders.¹ In this study, we tried to determine the optimal recipe for canned fruits, which are useful and unconventional raw materials, in different variants.

It is important to choose the optimal recipe for the product, taking into account all its biochemical parameters. To do this, you first need to experiment with different options, as shown in the table below. Based on our previous experiments and the biological and chemical properties of capers, in our experiments and recommendations we have selected the variety "Uzbekistan 20" created by Uzbek scientists.² In this experiment, the jars with a capacity of

¹ Merganov. A. T. Recommendations on the technology of cultivation and processing of capparid (Capparis spinosa) variety "Uzbekistan-20" in the steppe, Namangan - 2011

² Merganov A.T., Eshonkulova N.T. Biological characteristics of the cultivar "Uzbekistan-20" of the plant Kavar (Capparis spinosa). Chemical composition and importance in medicine, "FarPI, 2015. №4 pp. 63-66.

400 g were canned in different proportions but with the same amount of hydrochloric and acetic acid. The goal is to determine which of the 6 options for canned food in containers of the same capacity is the most optimal and recommended option. The object and methods of this experiment are described in the first table below and in its comments.

**To find the optimal recipe for a marinated casserole
research**

Table 1

Options	Name and quantity of components, gr					
	capers	solt	spices	Pieces of garlic	Peppercorns	Acetic acid, ml
O-1	150	15	10	4	5	0.8
O-2	200	15	10	7	4	0.8
O-3	200	15	13	2	5	0.8
O-4	350	15	10	6	3	0.8
O-5	200	15	10	5	3	0.8
O-6	100	15	8	5	3	0.8

Dill, celery and other herbs were used to remove the unpleasant odor and taste of the capers fruit. Because garlic is rich in flavonoids and phytoncides, it has been used to enrich the chemical composition with these substances and in part as an antioxidant. Black pepper grains were used to give the product a delicate aroma. Acetic acid was used as a chemical preservative. To find the optimal amount of ingredients, we first set the goal of determining the optimal amount of fruit needed. Therefore, a wide range of fruits from 100 g to 350 g was tested in different variants with a 0.3% change in the concentration of the main marinade component. The organoleptic properties of canned or marinades made from 100 g to 200 g of fruit components were not at the required level, ie the balance of canned marinades and fruits was lost. When the amount of fruit was doubled, the taste of the finished product was slightly bitter and the taste of the fruit was lost due to the low percentage of filling in the jar. Therefore, it is not advisable to marinate the fruit from these options. Extraction of salt in an amount of 15 g of liquid filling creates a concentration of 3%. According to many years of research and experiments in fruit and vegetable canning technology, the concentration of 1.5-2% of table salt in the filling prevents the growth of osmosis microorganisms formed in plant cells above the osmotic pressure of the cells. However, due to the richness of biological nutrients in our experimental conditions, the above conclusion was reached after serious biotechnological calculations, taking into account the possibility of the development of osmotererant microorganisms, and the optimal concentration of oysters was set at 3%.

The use of vinegar, which is one of the chemical preservatives, was set at 0.8 ml. Because the concentration of 1.5-2% water and other organic acids completely stops the growth of putrefactive microorganisms. Because the enzymes involved in their cell wall synthesis are completely inactivated, the cell membrane of microorganisms is not formed, and all the protein structures present in its cytoplasm are denatured. As a result, the biological cell dies. Based on the above and the results of the experiment, the optimal recipe is 3 - 200 g of caper, 15 g of table salt, 13 g of herbs, 2 cloves garlic, 5 peppercorns and It was found to be 0.8 ml of acetic acid.

Another method of preserving capers is pickle. We aimed to study the combination canning method of salting capers. Combination canning reduced moisture content in caper fruit by 14%, 25%, 35% and 75% then the effectiveness of canning by adding salt to it is learned in result of researches. Drying of capers was done by regime of soft dehydration in the drying cupboard called "CIII-5" and thermostat. The dehydration control was performed

and monitored at various stages before and after drying. The results of the survey are presented in Table 2

Determination of prescription pickled caper without marinade
Table 2

options	name and amount of components					
	caper	salt	sugar	greens	Lifetime to save	Degree of dehydration
O-1	1000	30	50	25	More than 6 months	Dry until 14% humidity
O-2	1545	30	50	25	More than 6 months	Dry until 55% humidity
O-3	1850	30	50	25	More than 6 months	Dry until 25% humidity
O-4	2000	30-45	50	25	More than 6 months	Dry until 35% humidity
O-5	1250	30	50	25	3 months	Dry until 75% humidity
Control	600	30				

The best recipe for preserving pickled capers after dehydrating the marinade is presented in option 2 and option 3. When the fruit of jar is dehydrated up to 55% moisture, can contain 1545-1550g products. Reducing the moisture content of the fruit by 35% will allow the jar to accommodate up to 2000gr of natural fruit. The amount of salt in the jar was 30g in the 2nd version, in proportion to the caper mass, while the 4th version proved to be 30-45gr depending on the weight of the product. Option 2nd salted capers were quickly rehydrated as a result of washing with water before retaining their elasticity and their cells were tense and improved organoleptics. Observations in other versions of the experiment showed that drying up to 14% of fruit in the first variant does not need to be added to the salt. Because there was no change in the product that had been stored for 14% humidity without salt. Drying of capers up to 25% moisture and organoleptic disturbance caused by their roghing. Changes in color and appearance of dehydrated fruits to 75% moisture have been observed to be invalid. After dehydration of caper fruit until 55% it was determined that pickling is the best option. In determining the optimum temperature for sterilization of marinated apples, we should take into account that all canned food is a good nutritional environment for microorganisms. However, micro-organisms cannot thrive well in all foods. Because most of them do not develop in sour environments. The heat treatment also exacerbates the acidity of the acids in the microorganisms, which are easily killed by sterilization. In low-sulfur conditions, the microorganisms are much less resistant to heat. Based on the above, it can be concluded that the microorganisms in sour environments have low heat resistance and it is desirable to select a sterilization temperature between 80-100°C to avoid destructive changes in the product under high temperature. Microorganisms that cause serious human health problems - botulinus - are the main threats to the preservation of protein-rich products. The most dangerous of them is the Batulism virus. This is because all viruses can develop even when the pH is 4.2. Clostridium may develop or die poorly with a pH below 4.2. From this logical analysis we can conclude that preservatives should be sterilized at temperatures below 100°C or higher, when the food pH is below 4.2. Based on the above, we have chosen the sterilization temperature of 100°C because the pH of our canned products is 4.1-4.2. Capers canned with different exposures (over time) were determined for the optimal temperature at the selected temperature, and these products were monitored for a long time. The actual sterilization method was taken into account when the

water started boiling. The results of the experiment are presented in Table 3 below. Choosing the optimal sterilization mode for marinated cauliflower (for 1-82-1000 jars)

Table 3

Type of container	Duration of actual sterilization, minutes					
	5	8	10	15	20	30
1-82-1000	Best before 22 ⁰ C-22 days	Best before 22 ⁰ C-Less than 2 months	Best before 22 ⁰ C-More than 6 months	Best before 22 ⁰ C-More than 6 months	Best before 22 ⁰ C-More than 6 months	Best before 22 ⁰ C-More than 6 months
Comment	A muddy sediment is formed, The bloating of the jars is mainly due to the development of vegetative forms of microorganisms	In the first period a clear, then muddy sediment is formed and the jars are bloated	Stability, clarity and no changes			

Optimal recipe for canned marinated capers (for 1-82-1000 jars)

Table 4

components of prescription	Capers buds,gr	Salt, gr	Acetic acid, gr	garlic (piece)	Spices, gr	Sugar, gr
amount of components	600	30	1.3	4	25	50

Orgonoleptic indicators of canned capers (for 1-82-1000 jars)

Table 5

Color	pale green, chlorophyll-specific
Taste	moderately sour, without taste
Smell	fragrance, as spicy
Consistency	homogenous liquid
Appearance	Fruits and liquids are stored in the same composition throughout the whole container

It is recommended to follow the technological process of preserving the marinated capers as follows.

Harvesting fruit - capers are harvested in 2-3 quarters of May and mid-June. For canning, capers of 10-12 mm are harvested.

Inspection - Because of apples are of high nutritional value, they are sorted out as they are infected with microorganisms and pests.

Sort by size - To improve the orgonoleptics of the canned, they are sorted by 10mm and 12mm or more.

Washing - in ventilated washing machines, the surface of the fruit is cleaned by washing with drinking water at a pressure of 1.5-2 atmospheres.

Dehydration - The surface of the fruit is dried in mesh containers.

Mixing the ingredients - the prepared ingredients are mixed according to the recipe.

Packaging and pouring - sugar and marinade decoction is poured into jars after the components are placed in jars.

Lid sealing - Lacquered lids on packaged jars are sealed using vacuum sealing machines.

Sterilization - cans 10–10–10 / 100°C, 1.2atm. sterilized on the basis of the formula.

Washing jars - Wash sterilized jars and transfer to labeling.

Storage - the finished product is stored at room temperature at 22°C and relative humidity of 80-85%.

Conclusion. Based on the data obtained from the analytical results of the above experiments, the analytical results of the optimal conditions for the preparation of canned food were obtained. Comments and conclusions on the experiment were given in the sections dedicated to each experiment. In summary, the best option is to dehydrate the berries to 55% and then salt them. Based on the above, we chose the sterilization temperature of 100⁰C for our canned products, as the pH was 4.1-4.2. In the processing industry, new types of products are important for their environmental friendliness and naturalness. In our country, the processing of capers is of great importance, especially in the case of semi-finished processing of capers, which has a high export potential.

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