

Previous Processing – Sure Way for Promotion of Microbiological Safety of Germinated Broad Bean Seeds

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ABSTRACT

The microbiological contamination of broad beans seeds in the process of germination in husked and natural form was studied. It was shown that preliminary short-term hydrothermal treatment and removal of the fruit coat of broad bean seeds provides an increase in the dynamics of their germination and microbiological stability in the process of germination. Therefore, this method of germination of broad bean seeds can be recommended for practical use.

Keywords: Broad bean seeds, Germination in peeled form, Microbiological indices

INTRODUCTION

Germinated cereal products, such as natural are being used in health-improving diets [1-3]. Research conducted last years in this direction for the inventions of the products of functional purpose have obtained huge scales [4-9].

Based on it, our research with broad bean seeds, which are called “pakhla” in the folklore like traditional protein-bearing raw material, widely used in cooking, in order to get germinated composition and food products from its, deserves attention [10-14].

Proposed modified method by us of deriving the germinated broad bean seeds, in our view, replies above indicated specifications, makes impossible promotion of the level of microbial contamination of the germinated production. As in the process of germination of the latter twice – at the start of preparation of the seeds and their preliminary soaking results in significant decrease of microbiological filth of the raw material, due to smooth regulation of the preliminary short hydrothermal treatment for removing the most infected details of the beans – seed membranes. With that, the process of preparations of the germinated samples, promotion of their appearance and improvement of nutritive value of the ready production increases.

Thus, in order to decrease the microbial contamination of germinated seeds of broad beans and the time of its germination, increase the activity of endoenzymes, increase the receiver of the germinant in a developed process, short-lived special wet-heat treatment and removing bran covering, before soaking the raw material, was applied. After that the peeled seeds (seed lobe) were soaked in

drinkable municipal water at the temperature of $20^{\circ} \pm 4^{\circ}\text{C}$ (hydro modulus composed 1:10) during 21 h, then were germinated during 72 h. Every 12 h the amounts of the germinated seeds to their total number were written down (**Figure 1**).

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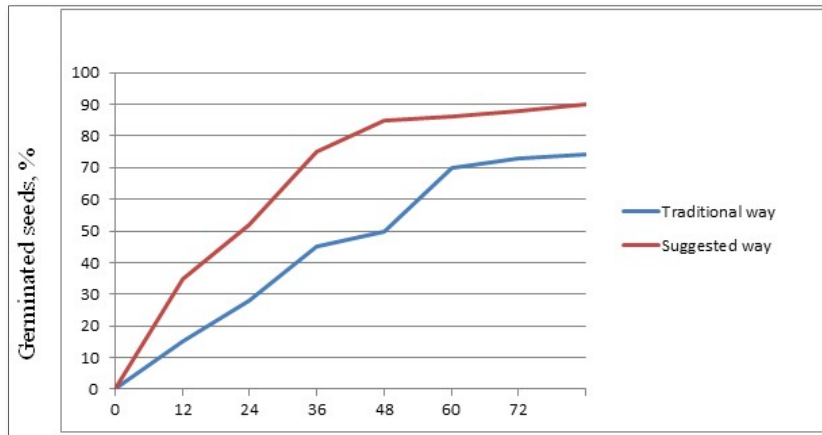


Figure 1. The dynamics of sprouting of the broad bean seeds depending on germination method.

Traditional method (natural unpeeled seeds) - Suggested method (peeled seeds)

It should be noticed, that in the process of germination of peeled bean samples by suggested method, they produce

double sprouts (**Figure 2**). However, at natural unpeeled samples it is hardly in evidence, in other words they possess single sprouts. Besides, the process of germination happens much more slowly in comparison to traditional way of germination.

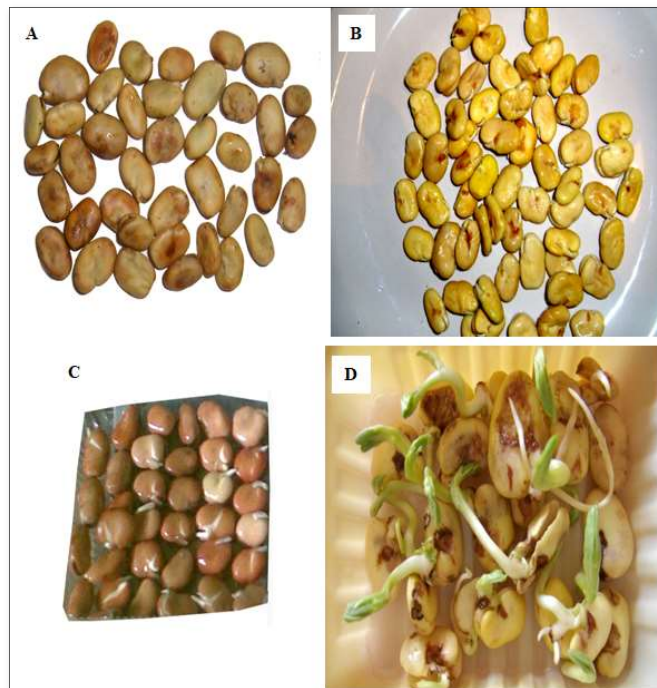


Figure 2. External appearance of the seeds of broad beans before and after germination depending on way of preproduction of the raw material (A) natural seeds; (B) Peeled seeds; (C) Germinated by traditional way; (D) Germinated by suggested way.

RESULTS AND DISCUSSION

The results of research alternations of morphological factors and appearance of the seeds in the process of germination are shown in the **Table 1**.

Table 1. Alternation of morphological factors and appearance of the broad bean seeds in the process of germination.

Kind, used for germination of seeds	Average dimensions of dry bean seeds, sm		Middle dimensions of alone and binominal sprouts after germination, sm		Middle mass of unpeeled and peeled germinated seeds with germinant (g)		Alternation of mass of the seeds after germination, (%)
	Length	Width	1 st	2 nd	Before germination	After germination	
With a husk (unpeeled)	3.0	2.0	1.9	-	2.7	7.3	267
Without a husk (peeled)	2.8	1.8	2.5	1.6	3.0	11.5	380

As seen from **Table 1 and Figure 1**, preproduction and removal bran covering from bean seeds, at the time as improvement of appearance of sprouts increase the dynamic of their germination. The microbial contamination of broad bean seeds, germinated by traditional and suggested way, was determined by well-knowing methods [15-17].

The determination of alternation results of microbiological factors of broad bean seeds in the process of germination is

Table 2. Microbiological attributes unpeeled and peeled broad bean seeds in the process of germination.

No.	The technology of germination	Microbiological attributes afloat seeds, CFU, g			
		Mesophilic aerobic and facultative anaerobic microorganisms	CB in 0.1 g seeds	Yeast	Fungus
Germination of natural unpeeled seeds					
I	Seeds after soaking	6.0×10^5	Is absent	Not detected	Not detected
	Seeds after germination	1.6×10^{12}	Elicited	3.0×10^3	30
Germination of peeled seeds					
II	Seed lobes after soaking	3.0×10^2	Is absent	Not detected	Not detected
	Seed lobes after germination	2.5×10^6	Is absent	<15	<15

Taking into account the high-quality and quantitative factors of germinated broad bean seeds by suggested technology and perspective of their usage for deriving functional nutritional products, it is considered to be desirable the additional research of the condition of microbial contamination of germinated samples in the process of storage. Being that, given type of the production in spite of popularity, possess short term of storage.

available in the **Table 2**. As seen as from the factors in the **Table 2**, natural seeds in the process of preparation for germination possess twice as large contamination, than the seeds removed from bran covering by applying preliminary wet-heat treatment. An analogous scene is observable in the ready germinated samples.

According to the information shown in the **Table 2**, the appliance of suggested technology of broad bean seeds germination by usage of peeled seed lobes under soaking, stipulates their reduction of contamination about 2 h, which further reflects the deplumation security layer of germinated germinant, which composes about 2.5×10^6 (of CFU/g), which is close to the ratio for ready production (5.0×10^5 CFU/g for cereals). All of this confirms practicability of

broad bean seeds germination after their husking via use of short-time wet-heat treatment.

For this reason, in order to increase the drawdown period of germinant (including seed lobe) made from broad bean seeds and for prevention of their recontamination with microorganisms, germinated samples after well washing were dried on the air, kept in polythene bag weighing of 100-150 g in the refrigerator at +6°C till 5 days. Researches have shown that, safety preservation of germinated seeds in polythene bags is provided maximum till 4 days, as after 5 days of their preservation in the bags the bacterial load growths above accepted level of safety [18].

The research allow to draw the conclusion that, the usage of directed regime of bean seeds germination in peeled form allows not only to speed up the time for germination, but also to derive seed mass with the least microbial contamination.

CONCLUSION

1. Short-term moisture-thermal treatment of broad bean seeds with the aim of peeling and reducing anti-nutritional factors in them, provides a simultaneous improvement in seed yield and their microbiological parameters during germination.
2. Removing the fruit coat of broad bean seeds by means of thermal treatment approximately halves the microbiological contamination of the original seeds.

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