

BIOLOGICALLY ACTIVE FOOD ADDITIVES FROM LOCAL AMARANTH VARIETIES GROWING IN UZBEKISTAN

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Abstract

The purpose of this work is to evaluate the commercial indicators of biologically active food additives obtained from local varieties of amaranth based on organoleptic, physicochemical indicators, requirements for raw materials.

Keywords: dietary supplements, amaranth, food additives, tablet, capsule, powder, technical requirements, packaging, labeling, control methods.

Introduction

Biologically active food additives are available in the following range:

- ❖ Tablets
- ❖ Capsules
- ❖ Powder
- ❖ in the form of oil.

Biologically active food additives must meet the requirements of the organization's standard, be produced according to technological instructions and recipes in compliance with sanitary standards and rules approved in the prescribed manner [1-5].

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Requirements for raw materials and supplies.

Raw materials of plant species of the flora of Uzbekistan and materials used for the production of biologically active food additives must be approved for use by the Ministry of Health of the Republic of Uzbekistan. Incoming inspection of raw materials and supplies is carried out in accordance with interstate standard 24297 [6].

The following raw materials are used for the production of biologically active food additives:

- ❖ amaranth seeds – *Amaranthus* – according to interstate standard 24027.0-80 or according to a certificate of conformity [7];

- ❖ leaves, flowers of amaranth - according to current regulatory documentation;
- ❖ Stevia (*Stevia rebaudiana* L.) TU 9729-004-00668620-99;
- ❖ Stevia concentrate purified from sweet substances;
- ❖ Stevia leaf extract TU 9154-003-17444221-09;
- ❖ Milk thistle (*Silybum marianum* L.)
- ❖ safflower leaves and flowers - according to interstate standard 12096 or according to a certificate of conformity;
- ❖ sunflower oil – according to interstate standard 1129 [10];
- ❖ D3 – according to the current ND or according to the certificate of conformity.

Supporting materials.

- calcium stearate according to current normative documents or a certificate of conformity;
- magnesium stearate according to current normative documents or a certificate of compliance;
- microcrystalline cellulose – purified according to the current ND or imported according to a certificate of compliance;
- sugar according to interstate standard 31361 or according to interstate standard 31895 [11];
- potato starch according to interstate standard T 7699;
- maltodextrin according to the current ND or certificate of conformity;
- food natural extract or flavorings according to interstate standard 32049 or imported according to a certificate of conformity [12];
- purified water – according to the certificate of conformity;
- drinking water – according to O'z DSt 950 [13].
- citric acid – according to interstate standard 908 or according to the certificate of conformity [14];
- sodium citrate - according to the current ND or according to the certificate of conformity;
- imported potassium sorbate according to a compliance certificate;
- rectified ethyl alcohol from food raw materials according to O'z DSt 3115 [15];
- gelatin capsules - according to the current ND or certificate of conformity;
- for product packaging, packaging materials must meet the requirements of standards approved in the prescribed manner.

Raw materials in which the residual amount of toxic elements and microbiological indicators exceed the maximum permissible levels established by SanPiN 0283 [16] are not allowed for production.

Package.

Biologically active food additives in the form of oils are poured into vials or bottles with a screw thread on the rim with a capacity of 10.0 ml to 500.0 ml of various types: glass, glass and polyethylene bottles according to current regulatory documentation.

It is allowed to use other containers, as agreed with the consumer and approved for use for this product name by the Ministry of Health of the Republic of Uzbekistan.

Bottles and vials containing dietary supplements for food must be tightly sealed and not leak when turned over.

It is allowed to pack vials and bottles together with instructions for use in boxed cardboard packs according to interstate standard 7933, interstate standard 33781. The gross weight of the transport container should be no more than 10 kg.

Biologically active food additives in the form of powder/granules are packaged weighing from 1.0 g to 200.0 g in cardboard packs according to interstate standard 7933 or weighing from 0.5 g to 10.0 g in a sachet or for one-time brewing in imported paper bags production according to a certificate of conformity, which are from 1 pc. up to 100 pcs. placed in cardboard packs according to interstate standard 7933 [17].

It is allowed to produce dietary supplements for food with a net weight from 1.0 g to 500.0 g in bags made of polyethylene film of basic brands according to interstate standard 10354 [18] or cellophane film according to interstate standard 7730 [19], approved for contact with food. For gluing packs and paper bags, polyvinyl acetate dispersion must be used according to interstate standard 18992 [20] or imported according to a certificate of conformity. Polyethylene bags must be glued together by heat sealing; bags for one-time brewing are glued together by heat treatment. It is allowed to use self-adhesive stickers for boxes.

Biologically active food additives in the form of capsules/tablets are packaged weighing from 300.0 mg to 1000.0 mg in contour-cell packaging made of polyvinyl chloride film and lacquered printed aluminum foil (blister), approved for use by the Ministry of Health of the Republic of Uzbekistan from 1 to 30 pieces or in bottles made of polymer materials in accordance with current regulatory documentation in quantities from 10 to 140 pieces. Blisters and bottles in quantities of 1 to 4 pieces are placed in boxes made of boxed cardboard according to interstate standard 7933, interstate standard 33781 [21].

Packs, bags, bottles (cans) are placed in boxes made of corrugated cardboard according to interstate standard 13511 [22] or imported according to a certificate of conformity. The boxes are covered with paper-based adhesive tape in accordance with interstate standard 18251 [23], or with imported adhesive tape in accordance with the certificate of compliance.

Permissible negative weight deviations for packaged goods must comply with the requirements of O'z DSt 8.022 [24].

Product packaging must comply with the requirements of UzTR.476-021 [25].

Marking.

Each packaging unit - consumer packaging, must be marked in the form of a pasted paper label made from label paper according to Marking.

Each packaging unit - consumer packaging, must be marked in the form of a pasted paper label from label paper according to 7625 [26] or writing paper according to interstate standard 18510 [27] indicating:

- o name of the manufacturer, its trademark (if any), address (legal and actual) and telephone number;
- o product name;
- o composition;
- o release form;

- o instructions for use;
- o information about contraindications;
- o volume, ml (for oils);
- o net weight (tablets, capsules, powder), g;
- o quantity per package, pieces;
- o date of manufacture (day, month, year);
- o expiration date (month, year);
- o the inscription: "Dietary supplement for food, is not a medicine";
- o storage conditions;
- o designation of this organization standard;
- o information about certification;
- o barcode with registration number (if necessary);
- o "O'zbekistonda ishlab chiqarilgan" or "Produced in Uzbekistan" when selling on the domestic market, when supplying products for export - "Made in Uzbekistan"

If all the necessary information cannot be included on the packaging unit, it is allowed to include the missing information in the package insert (annotation, instructions for use).

Each piece of cargo is marked with transport markings in accordance with interstate standard 14192 indicating the handling marks: "Fragile. Carefully!" (for glass bottles), "Keep away from sunlight", "Keep away from moisture" [28].

For each unit of transport container in which packaged products are placed, marking is applied to one of the end sides of the box using a stamp, stencil, or sticking a label containing the following information data:

- name of the manufacturer, form of ownership, its trademark (if any), address (legal and actual), telephone number;
- Name of product;
- number of packaging units, pieces;
- net weight, kg;
- date of manufacture (day, month, year);
- storage conditions;
- expiration date (year);
- information about certification;
- designation of this organization standard;
- "O'zbekistonda ishlab chiqarilgan" or "Made in Uzbekistan" - when selling on the domestic market, when supplying products for export - "Made in Uzbekistan".

Product labeling must comply with the requirements of UzTR.490-022 [29].

In terms of organoleptic indicators, biologically active food additives should not meet the requirements specified in Table 1 [30].

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 - net weight (tablets, capsules, powder), g;
 - quantity per package, pieces;
 - date of manufacture (day, month, year);
 - expiration date (month, year);
 - the inscription: “Dietary supplement for food, is not a medicine”;
 - storage conditions;
 - designation of this organization standard;
 - information about certification;
 - barcode with registration number (if necessary);
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- storage conditions;
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Table 1 Organoleptic characteristics of biologically active food additives

Names indicators	Characteristics			
Release form	Powder/ /granule	Pills	Capsules	Oil
Appearance	Ground mass	In the form of a round or other shape without company embossings on one side	Solid gelatin capsules of a cylindrical shape with a smooth, without damaged surface filled with crushed mass	Homogeneous transparent liquid. Slight cloudiness is acceptable
Color	From light green to Green colour	Depending depending on the color of the components		Light yellow to brown colors
Smell and taste	Weak aromatic, slightly astringent, bitterish, without foreign aftertaste and odor with a predominance of the odor of the plant composition			

In terms of physicochemical indicators, biologically active food additives in the form of granules/powder must comply with the standards specified in Table 2 [31-37].

Table 2 Physico-chemical indicators of biologically active food additives (granule/powder)

The name of indicators	Norm
Humidity, %, no more	10,0
Content of extractive substances in terms of absolutely dry weight of raw materials, %, not less	20,0
Mass field of coarse fraction (grinding), %, no more	5,0
Mass fraction of metallomagnetic impurity	not allowed
Content of foreign impurities:	
- mineral (earth, sand), %, no more	0,1
- organic (parts of other non-poisonous plants), % no more;	0,1
Mass fraction of yellowed parts of raw materials,% no more	4,0
Presence of mold and rot	not allowed
Presence of poisonous plants and their parts	not allowed
Infestation by barn pests is not allowed	not allowed
Average weight of powder/granules in a bag, grams	from 0.5 to 200

In terms of physical-chemical indicators, biologically active food additives in the form of tablets/capsules must meet the requirements specified in Table-3.

**Table-3 Physical-chemical indicators of biologically active food additives
(tablet/capsule)**

The name of indicators	Norm
Average weight of capsules/tablets, g	0,3-1,0+ 15%
Mass fraction of moisture, %, no more	9,0
Disintegration, min, no more	30

In terms of physicochemical and safety indicators, biologically active food additives must meet the requirements specified in Table 4 [38-55].

Table-4 Physical-chemical indicators and safety indicators of biologically active food additives

The name of indicators	Norm
Acid number, mg KOH, no more	2,25
Mass fraction of moisture and volatile substances, %, no more	0,15
Mass fraction of non-fat impurities	absent
Peroxide value of active oxygen mmol/kg	10
Mass fraction of unsaponifiable substances, %, no more	0,5
Toxic elements, mg/kg, no more:	
-lead	0,1
- arsenic	0,1
- cadmium	0,05
- mercury	0,03
-iron	5,0
-copper	0,5
-zinc	5,0
Mycotoxins: aflatoxin Bi, mg/kg, no more	0,005
Pesticides:	
-Hexachlorocyclohexane (α -, β -, γ -isomers), mg/kg, no more	0,05
-DDT and its metabolites, mg/kg, no more than	0,1
-Cesium-137 Bk/kg	60
Strontium-90 Bk/kg	80

The content of toxic elements, residual amounts of pesticides, radionuclides and microbiological indicators must comply with the requirements established by SanPiN 0283. Determination of the content of pesticides and mycotoxins is carried out according to methods approved by the Ministry of Health of the Republic of Uzbekistan in the prescribed manner. Control methods for biologically active food additives in the form of oils, powders/granules and capsules/tablets are carried out according to regulatory and technical documents in the form of interstate standard, O'z DSt, GF. The quality of the packaging and the correctness of labeling will be checked visually. It is allowed to use other control methods, approved in

accordance with the established procedure, not specified in the organization's standard and ensuring the receipt of reliable test results.

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- *GOST - interstate standard.