

Research Drying Process with Herbal Helio Accumulation Drying Equipment

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Abstract

In this paper we consider the types of helio dryer for drying materials of plant origin. On the basis of literary analysis of one of the main disadvantages of the drying equipment is a large labor intensity mounting and operation of the equipment. Currently drying medicinal plants performed naturally. It is associated with a significant low quality of the finished product, so the need to develop a new drying equipment and technology. Researchers from Tashkent state technical university have developed a mini-helio accumulation drying apparatus for producing high-quality products from medicinal herbs. The result of the comparative analysis of different types of dryers helio has shown that their use contributes to a significant reduction in drying time by accumulation of energy as compared to the natural drying, at the same time preserves the biological active substances in the dried product. Also, discussed characteristics of motherwort (*Leonurus cardiaca*). The developers conducted an experiment on mini helio drying equipment. Recycling motherwort (*Leonurus cardiaca*) should be implemented in the following stages: reception of products, inspection, cutting, drying, grinding. During the drying process, experiments were conducted at a temperature of 45°C to 50°C and the drying time lasted 6 hours.

Keywords: Drying; Medicinal herbs; Helio accumulation; Drying equipment; Motherwort

Introduction

As the object of drying the medicinal herbs are composed of more water than dry substances. Total 5% to 8% of the water is held tightly, as it relates to cellular colloids, the main part of the water is in a free state. This may explain the slight drying of medicinal herbs raw materials to a moisture content of 10% to 12%, as well as the difficulty in removing the remaining moisture. Babaev and Volshanik [1] describes a solar dryer greenhouse type, consisting of a supporting brick pillars with purlins, rafters which are laid at an angle of 20°C to the horizon. The collected raw material, the last preliminary processing, expanded on the grid at the rate of 10 kg of raw material per 1 m² of surface and injected under glass, where is the drying process. One of the main disadvantages in this construction is its large labor input of installation and plant operation. Omarov [2], the results of research on dried fruit in a similar, above drying equipment. Comparative analysis of various types of dryers helio has shown that their use contributes to a significant reduction in the drying time compared to the natural drying, simultaneously with a high quality finished product [3].

Petukhov [4] describes a small combination a dryer for materials of plant origin with the additional the air heater. However, issues such as the determination of the optimal mode exploitation of of solar drying equipment and techno-economic characteristics of the proposed facility in the works have not been considered. Chemical composition of raw vegetable contains proteins, fats, carbohydrates and lipids, as well as plant material has capillary-porous structure. The biologically active substances (BAS), as vitamins, polyphenols, organic acids and minerals contained in small amounts, they are responsible for the flavor and biological value. These components are more susceptible to adverse movements in, which leads to a decrease in the biological value of the final product in the preparation of material for drying in the drying process [5-7].

Motherwort (*Leonurus cardiaca*)

External signs: The upper parts of the stems up to 40 cm with flowers and leaves. The stem is quadrangular, hollow, with thickness up to 0.5 cm. The leaves are opposite, the lower three-five lobes or separate, the inflorescences lobed or lanceolate, toothed or entire, wedge-shaped base with a length of 14 cm, width 10 cm. Inflorescences spicate,

interrupted; flowers and buds collected in whorls at 10-18 (20) in the axils of leaves, calyx tubular-campanulate with five teeth subulate-pointed, conical, barbed. Corolla up to 0.12 cm, two-lipped, as long as calyx, upper lip entire, the lower three-blade; stamens 4; ovary lower. Stems, leaves and calyx downy hairs [8,9]. Color grayish-green stems, leaves - dark green, the sepals - green, corolla - dirty-pink or pinkish-purple. The smell is weak. Taste bitter.

Microscopy: When considering the sheet surface are visible on both sides with thin epidermal cells of vilistnyimi sidewalls, especially at the bottom side. The stomata are numerous, are located mainly in the lower epidermis, surrounded by - 3-4 (rarely 2) about stomatal cells (anomotsitny type). Lronburg on a short stalk with 4-6 (rarely 8) secretory cells. Hairs in two types: numerous multicellular rough warty, expanded in places cell connections; small capitate hairs on the one-two-cell short stem with a rounded head, consisting of 1-2 cells [8,9].

The numerical indicators: Extractive substances extracted 70% alcohol none menie 15%, humidity of 13%, ash, total no more than 12%, ash insoluble in 10% hydrochloric acid solution is not more than 6%, blackened, brownish and yellowish plant parts not more 7%, stalks, including separated in the analysis, no more than 46% of organic impurities are not more than 3% of mineral impurities are not more than 1% [8,9].

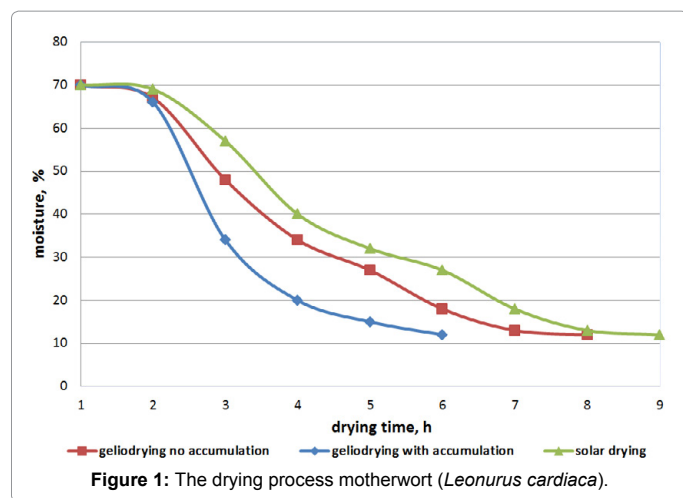
The crushed raw material: Extractive substances extracted with 70% alcohol, none menie 15%, humidity of 13%, ash, total no more than 12%, ash insoluble in 10% hydrochloric acid, no more than 6%, pochernevshik, brownish and yellowish plant parts max 7%, no more

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pieces of stems 46% of particles not passing through a sieve with holes having a diameter of 7 mm, not more than 17% of particles passing through the sieve with openings of 0.5 mm, no more than 16% of organic impurities are not more than 3% mineral impurities are not more than 1% [8,9].

Pharmacological properties: Motherwort herb has expressed sedative (soothing) properties. Preparations plants have antispasmodic and anticonvulsant effect, slow down the rhythm and increase the strength of heart contractions, have a marked hypotensive and cardiogenic action. Motherwort has a beneficial effect on carbohydrate metabolism and lipid exchange, and decreases glucose levels, lactic and pyruvic acids, cholesterol, total lipids in the blood, protein metabolism normalizes [10].

Chemical composition: The plant contains alkaloids (up 0.4%): leonurin, leonuridin, stahidrin; choline; sapononiny, flavonoids: quercetin, rutin, kvinkvelozid, kosmosiin, giperozid, quercetin, quercetin -7- glucoside izokvertsitin; iridoids: galiridozid, 8 atsetilgarpagid, ayugozid, ayugol, garpagid; essential oil (0.9%), which includes limonene, linalool, caryophyllene, α -humulene, α - and β -pinene; diterpenoids, steroid glycosides, caffeic acid glycoside, parakumarovaya acid, tannins (2.5%), bitterness marubin, colorants, resins, vitamin C, carotene; macro- and microelements [10].

Discussion and Conclusion

At the moment drying herbs performed naturally. It is associated with a significant low quality of the finished product. It is therefore necessary to develop new technologies and drying equipment [11,12]. Tashkent state technical university scientists have developed a mini-helium accumulation drying equipment for high-quality production of medicinal herbs [13,14]. Recycling motherwort (*Leonurus cardiaca*) should be implemented in the following stages: reception of products, inspection, cutting, drying, grinding.

The developers conducted an experiment on mini gelio drying equipment. During the drying process, experiments were conducted at a temperature of 45°C to 50°C for 6 hours (Figure 1). With these parameters, motherwort well dried and contained in its structure BAS well preserved. In appearance, it can be determined that the color and the taste is not changed (Figure 2). Thus, the application of solar gelio-drying recycled several products occurs in its performance products dryers with accumulation sources of solar energy. In the process of drying experiments were conducted at a temperature of 45°C to 50°C and the duration of the drying time of 6 hours. With these parameters motherwort well dried and contained in its structure BAS well preserved. In appearance, it can be determined that the color and the taste is not changed.

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