especially in samples infected by *F. graminearum*. Additionally, both surfactants effectively inhibited *Fusarium* mold growth, highlighting their potential for agricultural applications.

Nonenzymatic browning processing of natural products

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Introduction. The Maillard reaction a complex biochemical process is often known as the nonenzymatic browning, amino-carbonyl reaction, or protein glycation reaction. The non-enzymatic browning reaction is essential in the culinary sciences, foods, producing of tea, coffee, natural products and pharmaceutical industries.

The process is influenced by several factors like period, humidity, quantity of H2O, temperature, involved reactants, pH, type of product, and bioactive compounds.

During the processing, production, and storage of products, the nonenzymatic browning, is a crucial biochemical process, that have implications for bioactives, supplements, nutritional science and pharmacology, as certain compounds formed during this reaction can influence the bioavailability of nutrients, concentrations of actives, odor, taste, quality of product so on. Nonenzymatic process can enhance product quality, water-soluble sugars, amino acids, total polyphenols and flavonoids change the correlation during thermal processing, improvement in color, odor, flavor, and increasing of additional bioactive properties as antioxidative, proliferative, regenerative, biostimulatory etc. Furthermore, understanding the parameters that affect this reaction - such as temperature, pH, and moisture content allows biotechnologists to manipulate production process of tea, coffee, herbs, black garlic, and other products to achieve desired results, thus enhancing the bioactive quality.

The aim of the study. This paper aims to explore effective methods in processing of nonenzymatic browning for herbal products and garlic to improve the flavor and the bioactive quality and to shorten the processing time effectively. With

the future automation of continuous the processing with accent on retains the original bioactives components to the utmost extent in final product.

Materials and methods. Organic garlic *(Allium sativum)* and herbs was obtained from local region (fresh products). The processed products has been obtained during of nonenzymatic browning process with thermo equipment.

Results and their discussion. The process involving Maillard reactions create a widespread diversity of compounds. The reaction can occur through the covalent bond between constituents of carbonyl (C=O) and free amino groups (NH2). This reaction producing a large number of effective components that have importance and usefulness related to improving the quality, aroma, color, flavor of product and their bioactivities and useful proprieties. As a result of obtained products possess excellent antioxidant ability, via chelation of metal ions, breakdown of radical chains, hydrolysis, hydrogen peroxide, and scavenging of reactive oxygen species.

The method is relates to nonenzymatic browning of black garlic, which comprises the following:

1. Preparation of raw garlic keeping in a low-temperature 1- 7° C for 1-2 days.

2. High-temperature humidity processing, which is to seal the garlic in a closed containers, and keep the temperature 75-85° C, for 21-28days.

3. Moderate temperature processing 20-25° C, for 10 -15 days.

The processing time is greatly shortened, it can be accomplished in 32-45 days, without additives, the cost is greatly reduced the method is suitable for industrial production. For maximal increase of bioactive compounds, antioxidant activity, and its antiproliferative effects the processing time differ and can take from 3 month or more with lower temperature and changed technical profiles. This knowledge also paves the way for innovative applications, driving a continuous loop of research and development that fosters advancements in pharmaceutical industry.

Conclusion. This method is actual for processing of a large range of raw products, in our research we processed, herbs and black garlic. This intricate process not only enhances the sensory characteristics of products, imparting a rich array of

flavors, aromas, and colors, but also engages in the formation of complex compounds that can significantly influence nutritional, functional, bioactive properties.

Furthermore, understanding the kinetics of the Maillard reaction allows for better control in industrial processing, where consistency, safety, and quality are paramount, enabling the production of superior products that meet main demands for bioactives, taste and nutritional profile.

Synergy of bee products with medicinal herbs

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Introduction. Honey has been treasured for centuries, not just as a sweetener and food but also for its diverse medicinal properties. Bee products promote healing through reducing inflammation, enhancing circulation, and inducing a healthy immunological response. This golden elixir, produced by bees from the nectar of flowers, is often praised for its antioxidant, antibacterial, and anti-inflammatory effects. When combined with medicinal herbs, honey can enhance healing, boost immunity, and preventing of diseases. To understand the synergy between honey and herbs, it's essential to recognize the healing properties of honey. Raw honey contains a plethora of nutrients, including vitamins, minerals, enzymes, bioactives, and antioxidants. The primary active compounds in honey, such as hydrogen peroxide, flavonoids, and phenolic acids, contribute to its health benefits. They not only combat oxidative stress but also can help soothe coughs and sore throats, aid digestion, enhance immune system and skin health. Furthermore, honey's natural antifungal and antibacterial properties make it an excellent skin wound healing. Medicinal herbs have played a crucial role in traditional medicine for thousands of years. From Ayurveda to traditional Chinese medicine, herbs like ginger, turmeric, echinacea, and garlic have been used for their therapeutic benefits. Each herb comes loaded with its distinct set of properties, acting as natural remedies for various health conditions.