

IMPORTANCE OF CHROMATOGRAPHIC ANALYZES IN MEDICINE AND
PHARMACEUTICALS.

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Annotation: *Marigolds contain many chemical substances. The presence of hydroxybenzoic acid derivatives and flavonoids in the plant is important in the prevention and treatment of inflammation and eye diseases.*

Key words: *hydroxy benzoic acids, flavonoids, marigold, Agilent 1260, chromatograph, extraction.*

Marigolds

lat. - Tagetes ;

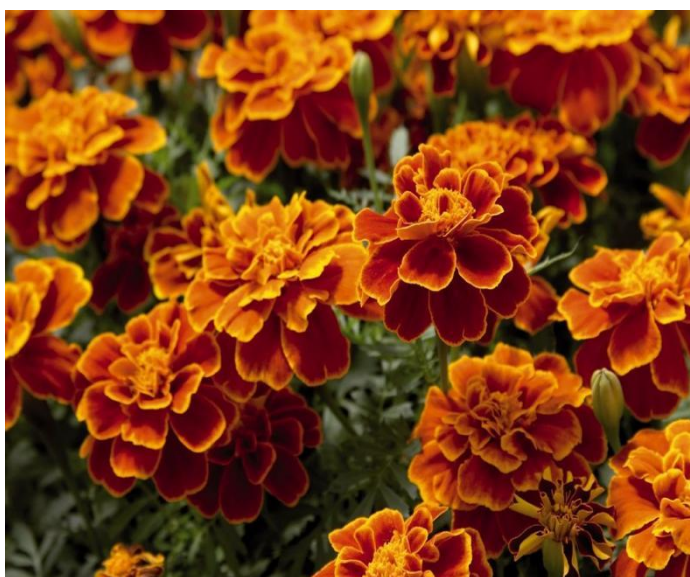
Uzbek - Marigolds ;

English - Marigold ;

German - Turkish carnation

Area:

*South America, Spain, Russia,
Uzbekistan, Turkey, India, China, Africa*



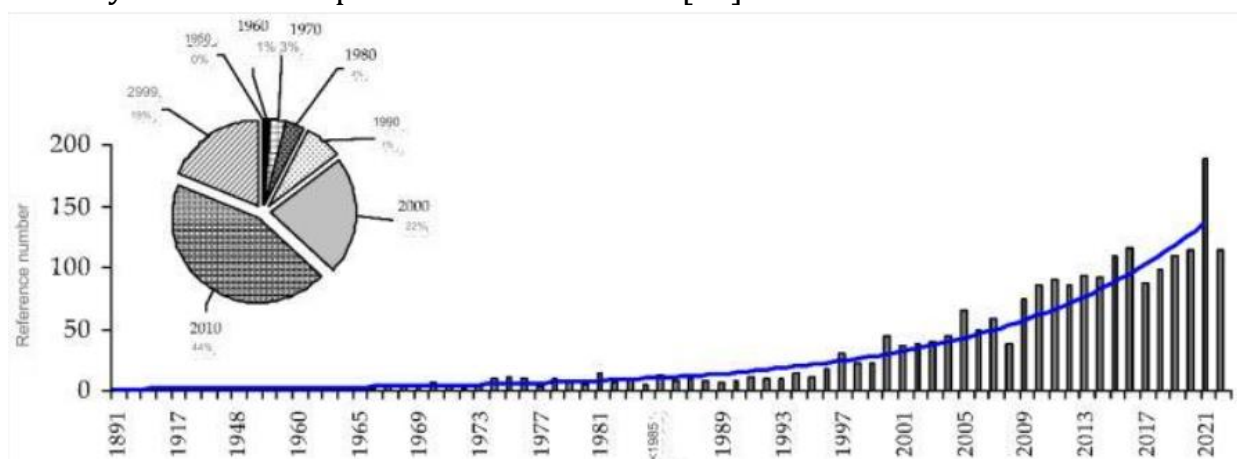
Marigold (*Calendula*) has a centuries-old history of therapeutic use in traditional and official medicine around the world. *Calendula* has been successfully used for more than a century. As a result, five species (i.e., *C. officinalis*, *C. arvensis*, *C. suffruticosa*, *C. stellata*, and *C. tripterocarpa*) were studied and 656 metabolites (i.e., mono-, sesqui-, di-, and triterpenes, phenols, coumarins, hydroxycinnamates, flavonoids, fatty acids, carbohydrates, etc.), are discussed in this review.[13-14] Thus, the genus *Calendula* is still a highly demanded plant-based medicine and valuable bioactive agent, and research on it will continue for a long time. The plant contains: beta-carotene isomers - lutein and zeaxanthin (net protect the curtain from photodamage); vitamins, microelements, macroelements, essential amino acids, saturated, monounsaturated and polyunsaturated (omega-3, omega-6) fatty acids.[12-9]

Hydroxy benzoic acids from methyl alcohol and ethyl alcohol extraction of marigold flowers include salicylic acid, o-anisic acid, p-hydroxybenzoic acid, protocatechuic acid, vanillin. acid, gentisic acid and syringic acid Later, p-

hydroxybenzoic acid, protocatechuic acid and vanillic acid identified six glucosides.[1-5]

Currently, hydroxy benzoic acids are synthesized using synthetic methods.[6]

The genus *Calendula* includes 12 species, of which *Calendula officinalis* L. is the most famous plant and the oldest medicinal remedy. There are over 2,000 articles on the study of calendula species from 1891-2022[14]



By far, the largest scientific contribution to the total number of studies on marigold was made during 2010–2019 (44% of publications); however, as approximately 19% of research on this topic has been completed during 2020-2022, the picture may change in the near future.[13]

As a result of studying the chemical diversity of the genus *Calendula*, 656 compounds were identified. These compounds mainly include large classes in qui. Monoterpenes 44 types Sesquiterpenes 163 types 34 glycosides Diterpenes 2 types Triterpenes Lupane derivatives Olean derivatives Carotenoids Phenols Benzoic acid derivatives Hydroxycinnamates Coumarins Flavonoids and anthocyanins Polysaccharides Fatty acids[14]

These substances include Ac-acetyl; β D Gal p — β - D-galactopyranose; β D Glc p — β D-glucopyranose; aL Rha p — a - L - rhamnopyranose flavonoids are of important medical importance. 2-4% of flavonoids are stored in various parts of marigolds, for example, roots, seeds, tubular and ligular flowers.[13]

Agilent 1260 high-performance liquid chromatography was performed in order to confirm the above data and compare the composition of marigolds distributed in Bukhara region.

For the analysis of flavonoids in marigolds, 20 g of flowers were collected from the central park of Bukhara city. After drying in a dry and shady place for 5 days, the dry mass obtained was 16 g. After the solution was divided into parts in a centrifuge, the sample taken from the above unsettled part was analyzed by Agilent 1260 high-performance liquid chromatography.

Agilent 1260 high-performance liquid chromatography was performed on a 1 μ m, 4.6x150mm column. Elution was performed in isocratic mode. The mobile phase was a

mixture of 0.1% orthophosphoric acid and acetonitrile (65:35). Eduant flow rate - 1.0 ml/min.

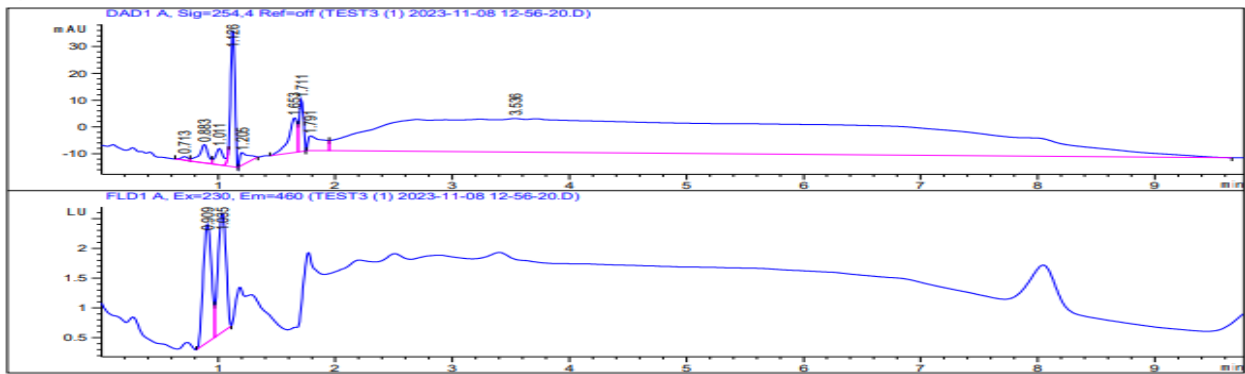


Figure 1. HPLS analysis of flavonoids in marigolds.

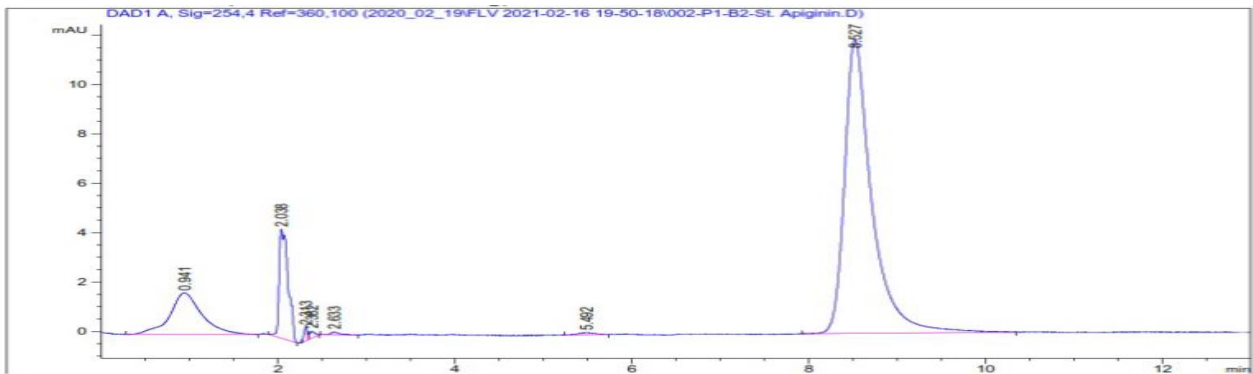


Fig. 2. HPLS analysis of rutin flavonoid in plant leaf

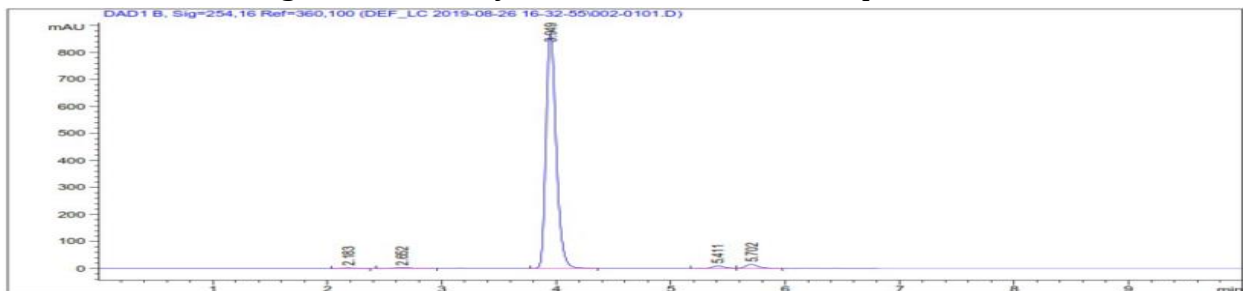
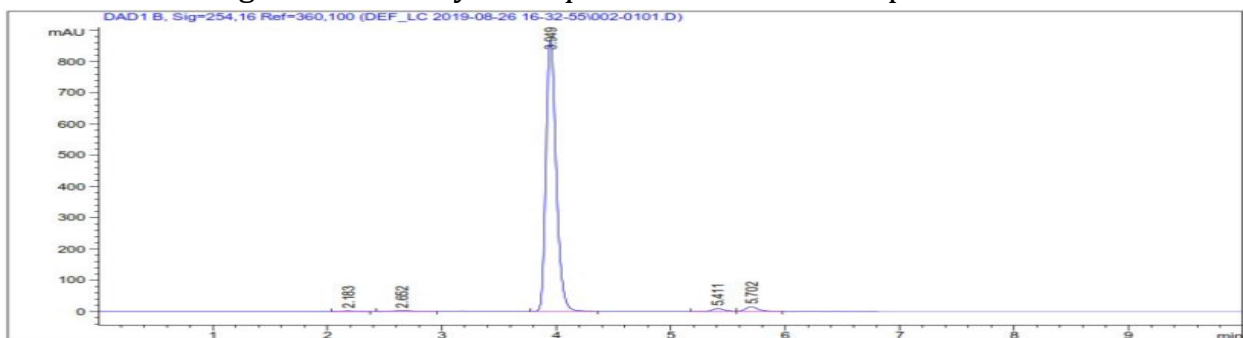


Fig. 3. HPLS analysis of quercetin flavonoid in plant leaf .



Picture 4. Plant leaf contained apigenin HPLS analysis of flavonoids . .

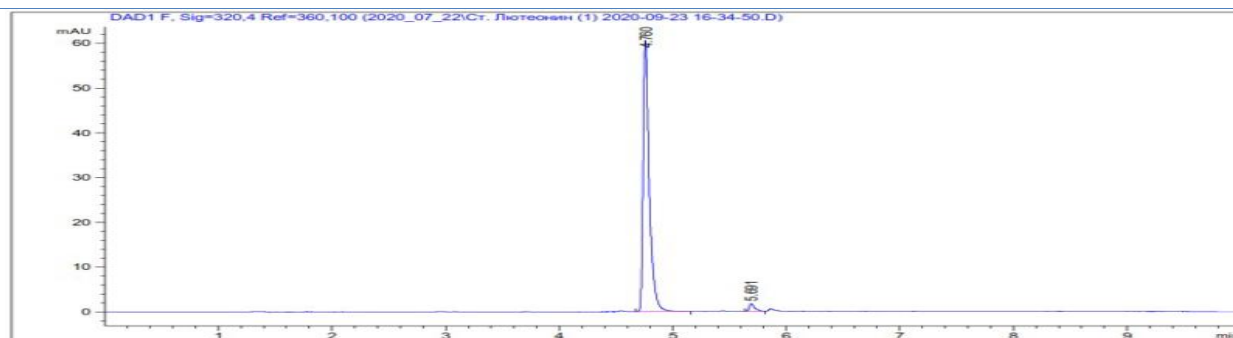
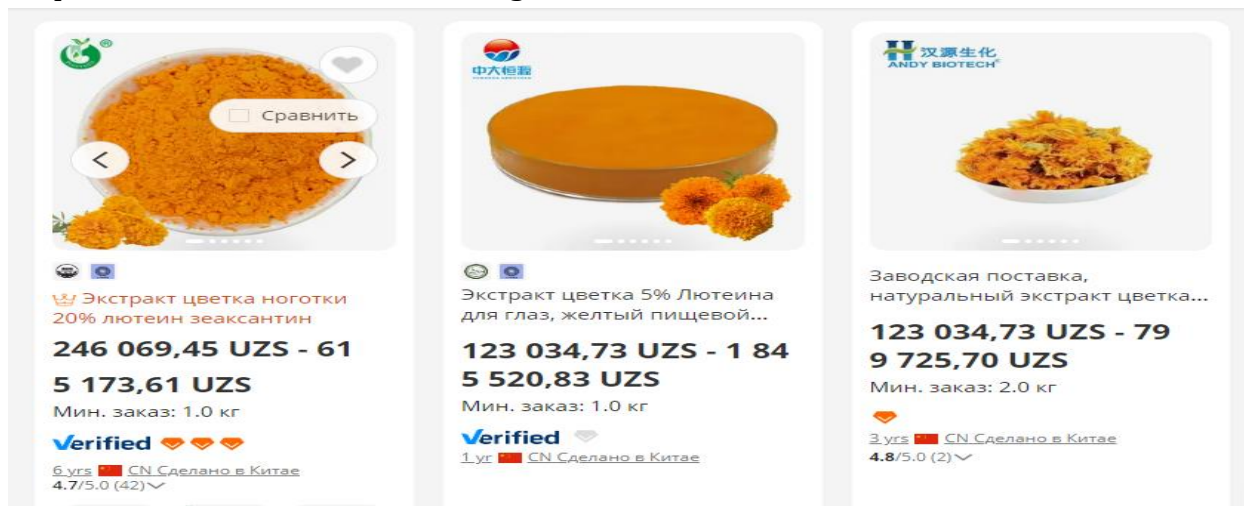


Figure 5. HPLS analysis of lutein flavonoid in plant leaf.

It can be seen that the amount of flavonoid lutein in the plant is higher than the amount of other flavonoids. Lutein is a biologically active substance belonging to the group of plant bioflavonoids, xanthophylls have antioxidant activity and react with active oxygen species to produce biologically active decomposition products. They can also inhibit the peroxidation of membrane phospholipids and reduce the formation of lipofuscin, both of which contribute to their antioxidant properties. Lutein is naturally present in the macula of the human retina. It filters potentially phototoxic blue light and near-ultraviolet radiation from the macula. The protective effect is partly due to the ability of these carotenoids to scavenge reactive oxygen species. Lutein is more stable to degradation by prooxidants than other carotenoids such as beta-carotene and lycopene . Lutein is one of two carotenoids identified in the human lens that may protect against age-related increases in lens density and cataract formation.

Currently, marigolds are sold in most developed countries in the form of mixtures and powders with various active ingredients from \$8 to \$45 in international markets.



In conclusion, it can be said that the substances stored in this plant are effective in eye diseases, when sensitivity to different lights increases, and the result of the use of various gadgets nowadays is to prevent eye fatigue and to treat them simply by eating marigold petals or alcohol extraction. and judicious use of tinctures is appropriate.

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