



Sunpure Extracts®
Private Limited

MARIGOLD Extract

US DMF No. - 035936

LUTEsight™ and *ZXANbright™*
(Lutein) (Zeaxanthin)

Marigold Extract

Lutein and Zeaxanthin

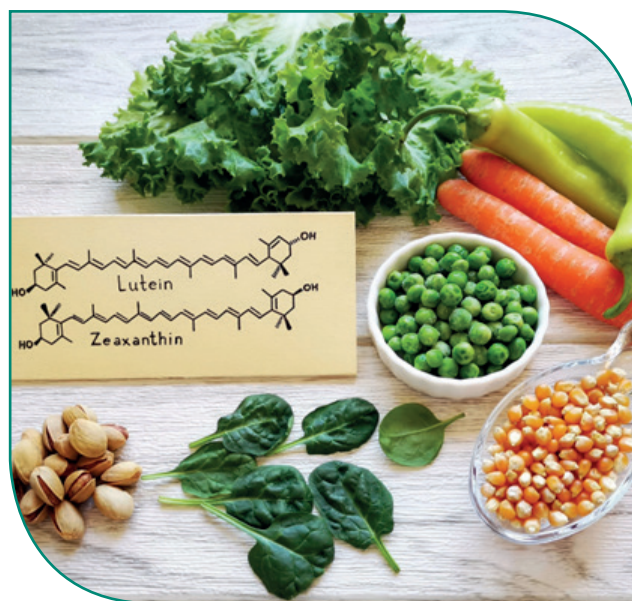
PORTFOLIO

Lutein is a carotenoid compound often referred to as a vitamin, closely related to beta-carotene and vitamin A. Derived from the Latin word 'luteus,' meaning 'yellow,' lutein is classified as a xanthophyll and is among the 600 naturally occurring carotenoids. It is exclusively synthesized by plants and, like other xanthophylls, is abundant in green leafy vegetables such as spinach, kale, and yellow carrots. Marigold flowers are particularly rich sources of lutein.

In plants, xanthophylls like lutein play a crucial role in regulating light energy during photosynthesis, acting as non-photochemical quenching agents to manage the excess production of triplet chlorophyll under high light levels.

Recognized for its powerful antioxidant properties, lutein is essential for maintaining eye health. Numerous scientific studies confirm that lutein is deposited in the macula and lens of the eye, suggesting its role in reducing the risk of age-related macular degeneration²⁻³ and cataracts⁴⁻⁵.

Lutein, along with zeaxanthin, is widely distributed in vegetables, fruits, flowers, and other natural pigments. Marigolds are particularly notable for their high content of these compounds, which impart an orange-red or orange-yellow hue. Lutein has a molecular formula of C₄₀H₅₆O₂ and a relative molecular mass of 568.87.



Commercially, lutein is available in various forms including extracts, microcapsule powders, and oil suspensions. Lutein powder, characterized by its orange-yellow color and slight hay-like odor, is insoluble in water but soluble in propanol, methanol, isopropanol, and dichloroethane, and exhibits good heat resistance. Encapsulation techniques are employed to protect lutein from oxidation and maintain its color integrity, making it suitable for incorporation into functional foods and healthcare products.

BENEFITS

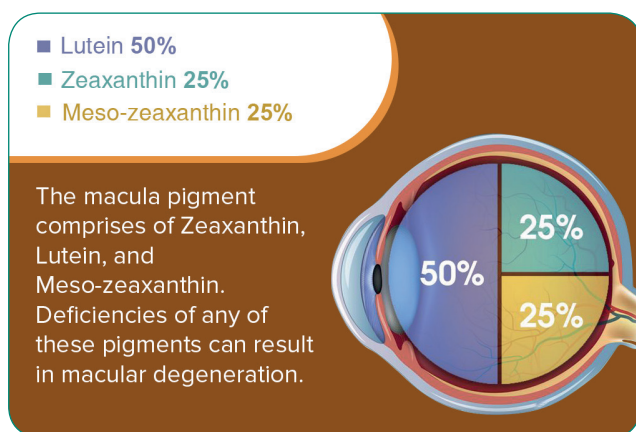
Improvement of Vision

Lutein is a crucial compound for human health, yet it is not synthesized by the body itself. The only way to obtain lutein is through dietary sources or supplements. Found predominantly in the macula, a small area of the retina responsible for central vision, lutein is believed to protect against oxidative stress and high-energy light. Research indicates that higher lutein intake correlates with increased pigmentation in the eye. This pigmentation, specifically in the macula, is associated with a reduced risk of eye diseases like Age-related Macular Degeneration (AMD).

Blue light, whether from indoor lighting or sunlight, can induce oxidative stress and potential damage to the eyes. Lutein acts as a filter for blue light and scavenges reactive intermediates generated during photo-oxidation, thereby protecting the eyes from oxidative damage.

As a major carotenoid, lutein plays a critical role in maintaining visual function by accumulating in the retina and lens. It acts as a potent antioxidant, neutralizing harmful oxygen molecules and serving as an effective blue light filter within the retina. This protective function helps safeguard the rod and cone cells of the optic system, contributing to the prevention and improvement of conditions like macular degeneration and cataracts induced by bright light exposure.

Supplementation with lutein has been shown to elevate its levels in human plasma, increase macular pigment density (MPOD), and effectively prevent early retinal lesions. These benefits underscore the importance of adequate lutein intake for maintaining eye health and visual acuity.



Filtering Blue Light

External light consists of different wavelengths of light, the shorter the wavelength the higher the energy. If the intensity of light and the duration of light exposure exceeds the retina's tolerance, it can cause damage to the retina. Blue light, with its relatively high energy, increases the number of free radicals in the macula of the retina, which in turn increases the amount of metabolic waste in the macula, causing more damage to the retina.

Lutein is yellow because its molecular structure absorbs and filters blue-violet light and reflects yellow light, a feature that protects retinal cells. Especially when the eye receives too much blue light and near-ultraviolet light, lutein can absorb these rays, like a layer of blue light "filter" on the retina. It protects the macula and retina by preventing damaging blue-violet light from acting directly on retinal cells.



Antioxidant

As a class of tetraterpenoids, lutein is rich in conjugated double bonds and has a strong scavenging ability of free radicals, which can effectively prevent the damage of oxygen radicals to cells. Some scholars used chemiluminescence to study and analyse the scavenging effects of marigold luteolin on peroxides, superoxide anions, hydroxyl radicals, and lipid radicals. The results found that luteolin has a strong scavenging effect on the above free radicals.



The synergistic antioxidant activity of two carotenoids, lutein and zeaxanthin, was investigated using a combination of in vitro antioxidant-based and in vivo antioxidant methods based on the in vivo ethanol oxidative damage model in mice. The synergistic antioxidant activity of lutein and zeaxanthin was found to be better when the ratio of lutein to zeaxanthin was 1:2. In the study of the relationship between lutein and

brain ω -3 polyunsaturated fatty acid (PUFA) oxidation, it was found that mitochondrial lutein was negatively correlated with docosahexaenoic acid (DHA) oxidation products. The accumulation of subcellular lutein and its relationship with DHA oxidation in the primate brain was also investigated, suggesting that lutein may be related to antioxidant function in the brain.

APPLICATIONS

In the Food Field

Lutein has a good colouring effect, it has a bright yellow colour, insoluble in water, soluble in oil, and ethanol, and resistant to light, heat, acid and alkali. Lutein powder is widely used in pastry, confectionery, beverages, rice and noodle products as a colouring agent. Lutein is used as a colouring agent in beverages and jellies. Orange juice beverages, milk beverages and carbonated beverages are added with lutein, and the retention of lutein is more than 90% after 6 months of storage.

For Health Products

Lutein is one of the carotenoids, and relevant studies have proved that it has a clear effect on preventing age-related macular degeneration and other eye diseases. In 1995, the U.S. Food and Drug Administration (FDA) reviewed the utility and safety of lutein and approved its use as a food supplement. In 2008, China listed lutein from marigolds in the catalog of new resource foods, and now marigold extract lutein powder is widely used as a raw material for health food and dietary supplements.

For Feed Product

Feed grade lutein powder can be applied for color enhancement of poultry skin, fat, shins, and egg yolks, as well as for trout, salmon, snapper and shrimp, and crab. The deposition pattern of lutein in chicken feed in the egg yolk has an impact on production performance, giving a bright yellow color to egg yolks, chicken skin, and chicken fat.

WHY TO CHOOSE SUNPURE'S LUTEIN?



CLINICAL TRIALS

- Lutein, Zeaxanthin, and meso-Zeaxanthin in the Clinical Management of Eye Disease. Randomized controlled clinical trials have revealed that supplementation of L and Z increases macular pigment density, improves visual function, and decreases the risk of progression of intermediate AMD to late AMD, especially neovascular AMD¹⁰.
- In a double-blind study, ingestion of xanthophylls (10 mg purified lutein + 0.3 mg zeaxanthin) with or without additional antioxidants by patients with early AMD resulted in 50% improvement in macular pigment optical density (MPOD) and significant improvement in visual function parameters including glare recovery, contrast sensitivity and visual acuity¹¹.
- Lutein supplementation for 6 months in AMD patients resulted in significant increase in MPOD by 27.9% and improvement in visual function parameters including differential light threshold (MDLT) and visual acuity (VA)¹²
- In an open trial, long term lutein supplementation showed significant increase in macular pigment density¹³.

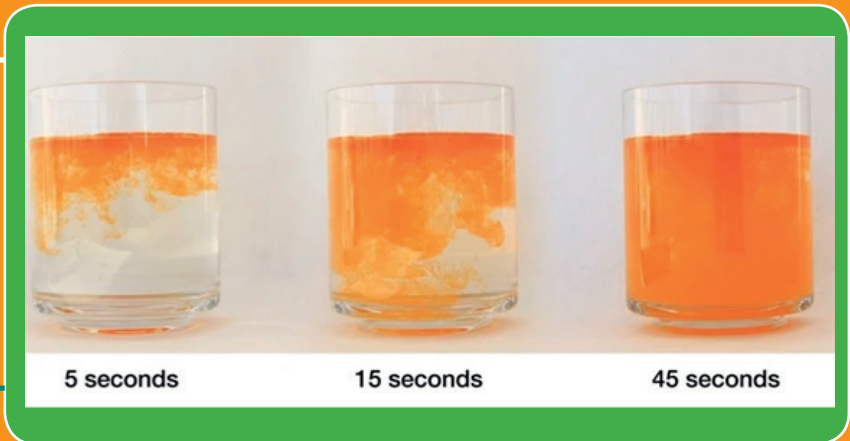
DOSE

10 to 30 mg / day / adult¹⁶.

SAFETY

Increasing doses of lutein supplements significantly increased the serum level of lutein, and doses up to 10 mg were safely administered. No toxicity was observed¹⁵

The observed safe level risk assessment method indicates that the evidence of safety is strong at intakes of lutein up to 20mg/d., although much higher levels have been tested without adverse effects¹⁴



MARIGOLD EXTRACT GRADES

Marigold Extract - Free Lutein (By GV & HPLC)

Powder Granules Beadlets Oil	Regular Ethanol	Free Lutein 5% - 40%
Powder	Regular Ethanol	Free Lutein 50% - 80%
Powder Granules	Water Soluble	Free Lutein 2% - 30%

Marigold Extract - Free Lutein with Zeaxanthin (By GV & HPLC)

Powder Granules Beadlets Oil	Regular	Free Lutein 5% - 40% with Zeaxanthin 1% - 8%
Powder Granules	Water Soluble	Free Lutein 5% - 10% with Zeaxanthin 1% - 2%

Marigold Extract - Free Lutein Ester (By GV & HPLC)

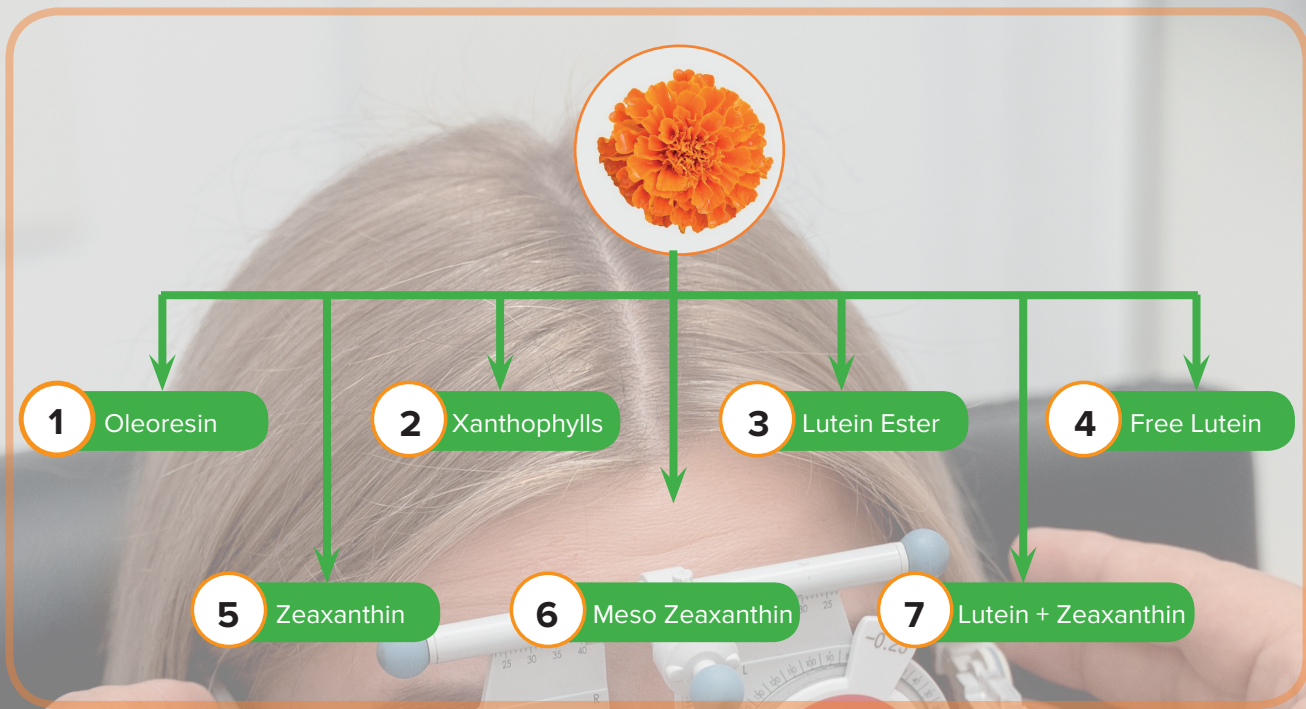
Powder Granules Beadlets Oil	Regular	Lutein Ester 5% - 40%
Powder	Regular	Lutein Ester 60% - 80%
Powder Granules	Water Soluble	Lutein Ester 5% - 10% - odour Free

Marigold Extract - Zeaxanthin (By GV & HPLC)

Powder Granules Beadlets Oil	Regular	Zeaxanthin 2% - 40%
Powder	Regular	Zeaxanthin 50% - 75%
Powder Granules	Water Soluble	Zeaxanthin 2% - 10%

Natural Colors (By GV & HPLC)

Powder		Free Lutein 5% to 30%
Powder		Zeaxanthin 2% to 10%



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Sunpure Extracts®
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REGISTERED ADDRESS

Sunpure House
L – 99 A, Dilshad Garden
Delhi – 110095, INDIA

MANUFACTURING FACILITY

E-25, Gopalpur Industrial Area
Sikandrabad, Bulandshahr (U.P.) 203205,
INDIA

CORPORATE ADDRESS

Sunpure House, Plot No. 11/29, Site-4, Sahibabad Industrial Area Ghaziabad,
U.P. 201010, INDIA

E-mail: info@sunpure.co.in | **Contact:** +91-120-3761106, +91-120-2989896-97

Website: <https://www.sunpure.co.in> | **Linkedin:** <https://www.linkedin.com/company/sunpureextracts/>