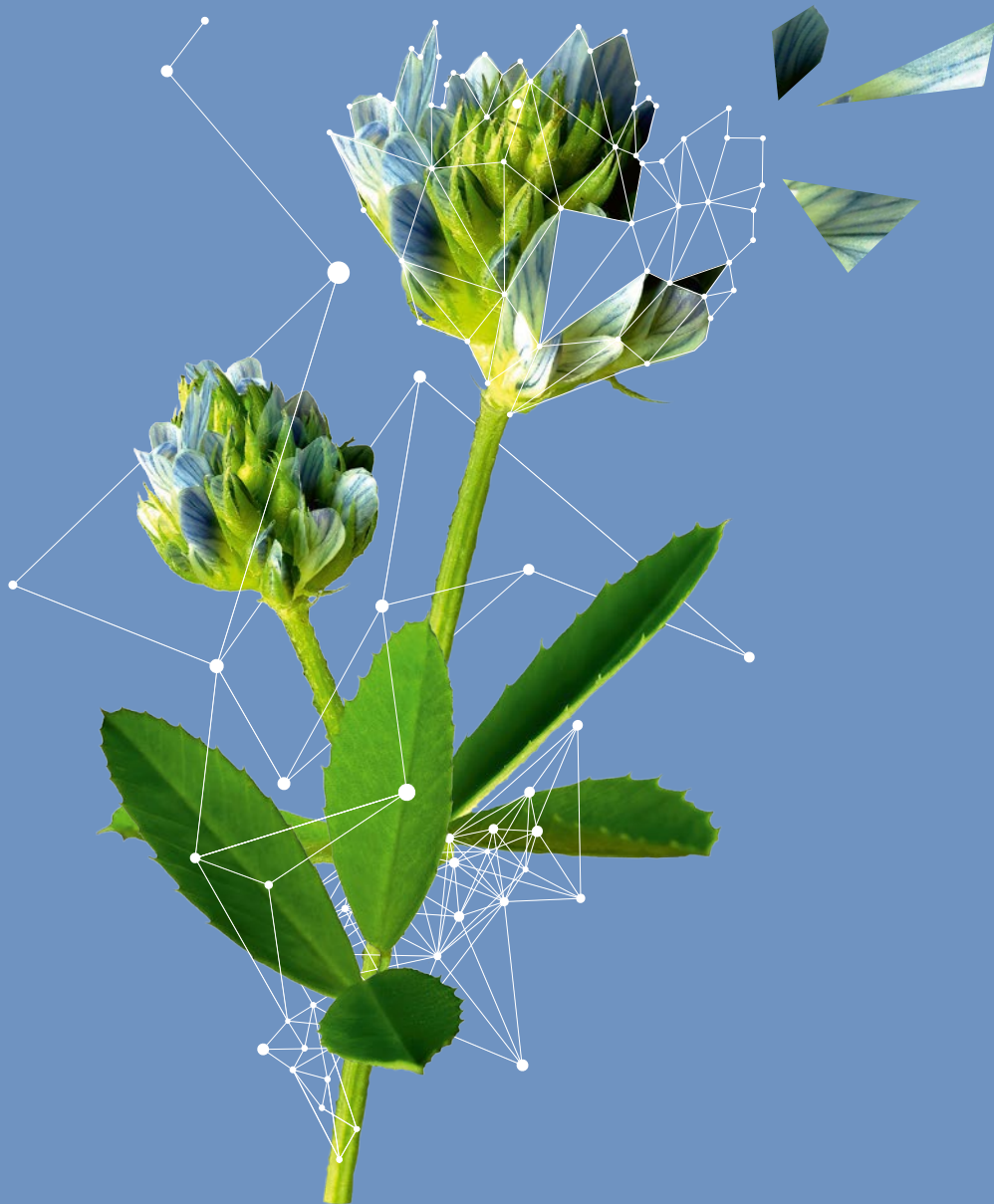


food&health



# FenuKale™ Nu

Pollution-detox and  
beauty formula



# FenuKale™ Nu

## Biological Source

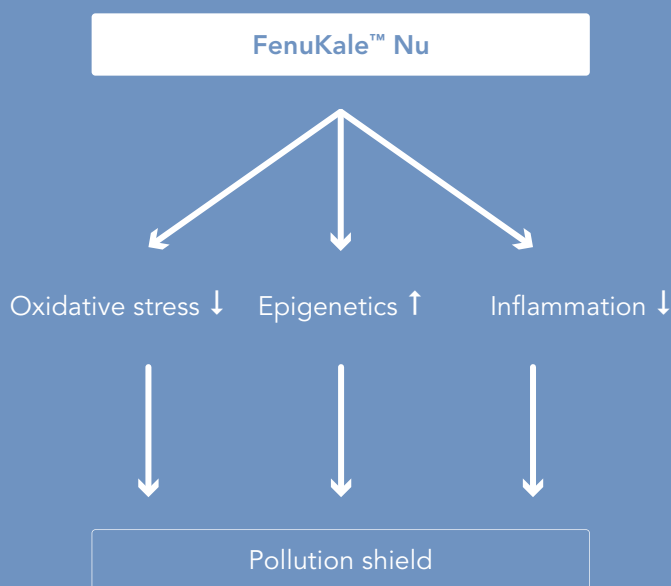


FenuKale™ Nu is a unique, natural, and antioxidant-rich powder extract prepared from blue fenugreek and kale leaves. Blue fenugreek (*Trigonella caerulea*) is a member of the bean family (Fabaceae) and native to the Alps and the Caucasus. It is an aromatic spice used in various food applications like cheese (sap sago), bread and spreads. Blue fenugreek is rich in saponins and flavonoid-glycosides such as Apiin. Kale (*Brassica oleracea*) belongs to the cabbage family and originates most probably from the Eastern Mediterranean and Anatolian region. Kale has gained huge popularity in recent years as a detox-superfood, being rich in iron, protein, carotenoids and vitamins C&K.

## Air Pollution



Environmental pollution is one of the most serious global challenges. Air pollution is a mixture of solid particles (particulate matters; PM) and gases in the air, mainly caused by traffic and factory emissions, dust and forest fires. Particulate matter could be harmful to the human health and the whole global ecosystem, causing severe chronic diseases. The European Environment Agency calculated 307,000 premature deaths due to exposure to fine particulate matter pollution in the EU in 2019. The WHO estimated 4.2 million premature deaths worldwide in 2016. Air pollution has also an impact on skin health, contributing to accelerated skin aging, atopic dermatitis and other skin disorders. Furthermore, exposure to particulate matter was shown in several studies to increase epigenetic age.



## Mode of Action



FenuKale™ Nu has been especially developed to counteract accelerated skin aging and skin damages caused by environmental pollution. A synergistic interplay of three different mechanisms protects the skin, acting as a pollution shield:

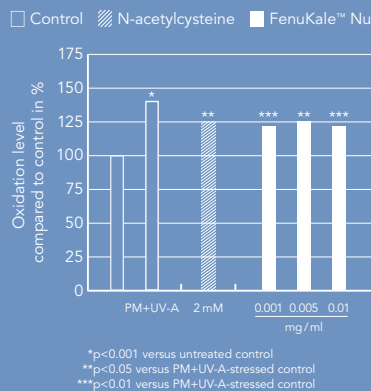
- Remarkable antioxidant activity against pollution-induced cellular protein damages
- Anti-inflammatory activity & pro-endothelial effects
- Protection of pollution-caused epigenetic damages

# Bioassay Study Results



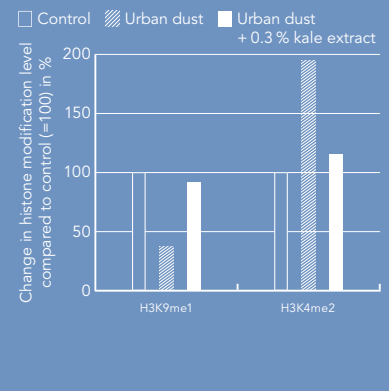
Oxidative stress caused by pollutants is a serious skin aging factor and protein carbonylation is a type of oxidative protein damage caused by free radicals. Human dermal fibroblasts were pretreated with FenuKale™ Nu and afterwards incubated with particulate matter and treated with UV-A radiation. FenuKale™ Nu significantly reduced carbonylated protein levels in treated cells. Furthermore, blue fenugreek extract reduced the release of the inflammatory cytokines IL-8 and CCL-2 and supported endothelial function by increased nitric oxide (NO) release in human umbilical vein endothelial cells. Finally, kale extract counteracted unfavorable epigenetic changes caused by pollution. This was demonstrated in a cellular model by attenuating Histone H3 modifications induced by pollution.

## Decreased pollution-induced protein damage



S-980 / © Mibelle Biochemistry

## Prevention of epigenetic changes caused by urban dust



S-750 / © Mibelle Biochemistry

# Clinical Study Results



The effects of FenuKale™ Nu on skin appearance were evaluated in a randomized, double blind, and placebo-controlled study. The clinical trial was performed with 60 healthy, female Indians living in a highly polluted region with an average age of 39.8 years. A total quantity of 350 mg of FenuKale™ Nu was taken, split in two doses a day, over a period of 56 days.

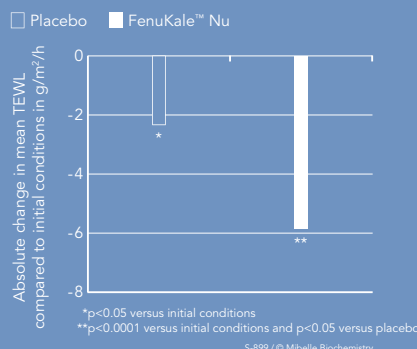
FenuKale™ Nu improved significantly trans-epidermal water loss (TEWL), which is considered an important marker for skin barrier function. Additionally, FenuKale™ Nu improved skin moisture significantly as pollution could lead to dry skin, resulting in a higher risk of various skin disorders. Furthermore, study results were confirmed by a questionnaire-based self-assessment evaluating different skin and appearance parameters. All parameters evaluated in the questionnaire significantly improved compared to initial conditions and placebo. Finally, FenuKale™ Nu has been tolerated well by all study subjects without any adverse effects.

## Self-assessed improvement of skin parameters



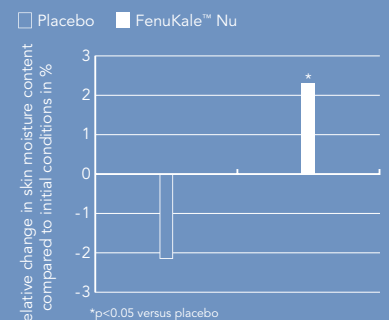
Differences in rating points in comparison to placebo

## Reduction of TEWL



S-899 / © Mibelle Biochemistry

## Increase of skin moisture



\*p<0.05 versus placebo

S-899 / © Mibelle Biochemistry

## Product Attributes

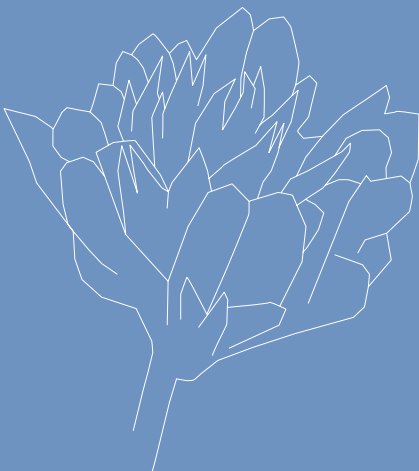
- Powder extract rich in antioxidative polyphenols
- Suitable for food supplements and functional food applications
- Aromatic, savory, condimental flavor
- Recommended daily dosage: 350 mg

## Suitable Product Applications

- Anti-pollution products
- Healthy aging products
- Skin beauty products
- Detox and antioxidant products

## Benefits

- FenuKale™ Nu is a natural and antioxidant-rich powder extract prepared from blue fenugreek and kale leaves in a 4:1 ratio
- FenuKale™ Nu prevents accelerated aging caused by urban pollution
- A synergistic interplay of three different mechanisms protects the skin by acting as a pollution shield
- FenuKale™ Nu counteracts cellular protein damage and epigenetic changes caused by pollution
- FenuKale™ Nu supports the anti-inflammatory response and endothelial function
- Improvement of skin barrier function and skin moisture have been demonstrated in a placebo-controlled clinical trial with study subjects living in a highly polluted region



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