

“UNVEILING THE POTENTIAL OF *Alkanna tinctoria*: A COMPREHENSIVE REVIEW”

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Abstract: From ancient times, various human and animal diseases and disorders have been treated and prevented using herbal products. Herbal medicine is still the foundation of about 60%–80% of the entire world population, mainly in developing countries but also in developed countries, for all forms of treatment in primary health care owing to better acceptability, compatibility with the human body, minimal side effects, as well as easy availability and affordability. *Alkanna tinctoria* is commonly found in India and is known as an important and popular plant. The present article attempts to briefly describe the ethnobotanical and medicinal applications of *Alkanna tinctoria* in the context of plant description. It is an attempt to compile and document information on the various aspects of *Alkanna tinctoria* with the potential for its application.

Keywords: *Alkanna tinctoria*, Ethnobotanical, Antioxidant, Antimicrobial.

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Introduction

Alkanna species is a flowering herb. It's part of the Boraginaceae family and dye plant occurring mostly in central Europe, the Mediterranean, and Asia. *Alkanna tinctoria* also known as dyers alkanet. That produce a red dye from its root. Alkanet is a hemicyptophyte species flowering from April to May. It is dark red. The plant of Alkanet consist of the chopped blackish red roots of the plant. The root bark of *Alkanna tinctoria* plant is used in cosmetics, food, and natural nutraceutical supplements. Alkane contain dark red naphthoquinone derivative pigments with biological activity, resins, tannins, waxes and pyrrolizidine alkaloids.^(1,2)

More than hundred years, herbal compound obtained from medicinal plant, minerals and organic matter it's the foundation of about 75-80% of the World population health care marketed and gaining popularity in developed and developing countries. Herbs have contain different active principle like Alkaloids, volatile essential oils, glycosides, oleoresins, steroids, tannins, terpenes and phenols. In the last few years there is an exponential growth in the field of herbal medicine because of the natural origin, easy availability, efficacy, safety and side effects.^(3,4)

The World Health Organization (WHO) has listed more than 21,000 plants, which are for a lot of therapeutic purpose all over world.⁽⁵⁾ They observed that about 74% of 199 plant-derived pharmaceutical medicine are used in recent medicine. It also estimates that 4 billion people presently used herbal medicine for health care.⁽⁶⁾

Medicinal plant researchers pursued with several goals like the development of low-cost therapeutic compound and the discovery of prototypic drugs.⁽⁷⁾ The plant is also known as dyers bugloss, orthant, Spanish bugloss, or Languedoc bugloss. *Alkanna tinctoria*

as a bright blue flower. The dyestuff in its roots soluble in alcohol, ether, and oils but is insoluble in water.

It is used to give color to wines and alcoholic tinctures, to vegetable oils, and to varnishes. In Australia alkanet use as a food coloring, but in the European Union, it is not. It as been used as colorant for lipstick and rouge.⁽⁸⁾

The coloring agent in *Alkanna tinctoria* root has been chemically isolated and named alkannin. In folk medicine, it is also to treat abscesses and inflammations. Derivatives of Alkannin were also detected, including Acetyl alkannin, Propionyl alkannin, Isobutyl alkannin, Angley alkannin, β -Dimethyl acryl-alkannin, isovaleric alkannin, α -Methyl-n-butyl alkannin, and β -Hydroxy-isovaleric alkannin.⁽⁹⁾

TAXONOMY:⁽¹⁰⁾



Figure.1 plant of *Alkanna tinctoria*

Kingdom: Plantae

Clade: Tracheophytes

Phylum: Magnoliophyte (Angiosperms)

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Class: Magnoliopsida (Dicotyledons)

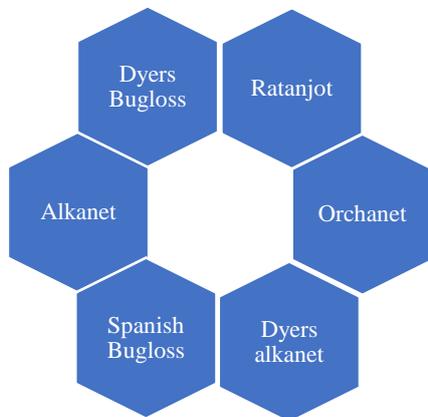
Order: Aboriginals

Family: Boraginaceae

Genus: Alkanna

Species: *Alkanna tinctoria*

COMMON NAMES:



DISTRIBUTION:

Around fifty species of these types of herbaceous plants are native to Europe, the Mediterranean, and Western Asia.⁽¹¹⁾ Although their originated to southern Europe, they are also grown in and imported from Turkey, Albania, India, and Egypt.^(12,13)

PLANT DESCRIPTION:

Description:

Alkanna tinctoria is a perennial herbaceous plant that grows primarily in the Mediterranean region. It is well known for its deep red root, which contains a natural dye used in textiles, cosmetics, and food coloring.⁽¹⁴⁾

HEIGHT: The height is usually between 20 to 50

Table.1 Description of *Alkanna tinctoria*

S.NO	PARTS OF PLANT	PICTURE	CATEGORY
1	Stem		<ul style="list-style-type: none">➤ Its stems are bushy, prostrate, grayish-green, and soft with long bristles.
2	Leaf		<ul style="list-style-type: none">➤ A definite arrangement.➤ Shapes are from oblong to lanceolate.➤ Roughly hairy, and hence gray-green in appearance.
3	Flower		<ul style="list-style-type: none">➤ Flower colors from blue to violet.➤ Funnel-shaped.➤ Clustered into racemes.➤ It blooms during the spring and early summer.

4	Root		<ul style="list-style-type: none"> ➤ The core of the thick, woody roots can be rich crimson or purple. ➤ Used for extracting natural dyes. ➤ Contains alkannin, a red pigment having medicinal properties.
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DISTRIBUTION AND HABITAT:

Naturally occurring in the Mediterranean region that includes the Middle East, North Africa, and Southern Europe. Grows well in well-drained, dry, rocky soils. Often by roadsides, meadows, and scrub.

USAGE: ⁽¹⁴⁾

Dyeing: A red-purple dye for clothing.

Medicinal: Traditionally used for their medicinal qualities like antibacterial, anti-inflammatory, and wound healing in herbal medicine.

Cosmetics:

Added to oils and lip balms as a natural colorant.

Occasionally used for coloring wines and oils in the food industry.

CHEMICAL CONSTITUENT: ^(16,17,18,19)

Numerous bioactive substances, mainly flavonoids, alkaloids, phenolic compounds, and derivatives of naphthoquinone, are found in *Alkanna tinctoria*. The most prominent ingredient is alkannin, which gives its roots their rich red color.

Alkanna tinctoria possesses a range of bioactive chemicals, including flavonoids, alkaloids, phenolic compounds, and naphthoquinone derivatives. Alkannin, the most prominent component, endows the roots with deep red coloring.

1. Naphthoquinones:

1. Alkannin-the main bioactive red pigment present in naphthoquinone pigments; shikonin-structural isomer of alkannin; acetyl alkannin, β -dimethyl acrylic acid alkannin, and isovaleryl alkannin.

2. Shikonin methyl butyryl. Amount of highly strong antibacterial, anti-inflammatory, and wound-healing agents.

2. Flavonoids and Phenolic compounds: Apigenin, Tannins, Lutein, Kaempferol, Quercetin. All these prove to consist of anti-inflammatory and antioxidant properties.

3. Alkaloids: Persistent alkaloids from pyrrolizidine species have the ability to do good or harm in lower or higher amounts, respectively.

4. Sterols and fatty acids:

Linolenic acid; palmitic acid contains β -sitosterol; stigmasterol. Such compounds can be employed in medicines or cosmetics due to their skin-protecting and moisturizing properties.

5. Triterpenes and Sterols:

Lupeol, Oleanolic acid

6. Essential Oils 9Volatile Compounds:

Terpenes, Sesquiterpenes.

PHARMACOLOGICAL ACTIVITY:

The Anti-Inflammation effect found ⁽²⁰⁾

Alkanna root is expected to reduce tightness and sluggishness in blood circulation, which tends to often cause migraine and headaches. Improving blood circulation may alleviate headaches. Alkanet effectively treats inflammation of bones and muscles due to its anti-inflammatory properties. The application of alkanet root essence oil on the inflamed area can relieve its symptoms and pain.

Antiaging activity ⁽¹⁵⁾

Skin, being the body's primary barrier, is vulnerable to outside elements that can accelerate aging and cause wrinkles. The application of or ingestion of alkanet root oil and powder can improve skin health and reduce wrinkles.

Anti-cancer activity

Alkanna species are known to combat thousands of malignancies. *A. tinctoria* (L.) root bark is rich in alkannin and sagely alkannin, which can inhibit human colon cancer cell growth by triggering G1 cell cycle arrest, inducing apoptosis. Alkanna Cappadocian was found to act against six of the twelve types of cancer employed in this research on cell lines of cancer. This plant has high promise due to the presence of 5-O-methyl-11-O-acetylalkannin in the root extract, along with mono-O-methylated alkannin derivatives. ^(11,14)

Supports and promotes high performance cardiovascular health

Alkanna root promotes heart health. In order to obtain the essence for drinking, alkanet root is soaked in water. By using alkanet root regularly, it aids in cleansing the body of toxins and boosts the functioning of the heart for circulation of blood. Alkanna roots will effectively alleviate the stress placed on the cardiovascular system while lowering blood pressure. This may help prevent a heart attack and decrease stroke risk. The activity of antioxidants in eliminating free radicals-the by-products of metabolism-may enter the body from hazardous compounds in the environment or in daily life. Alkanna roots can neutralize free radicals, thus stopping cell damage ^(11,22)

Hair and nail treatment

Alkanet root improves hair strength and prevents hair loss. They can prevent nail damage, mend cracks, and reduce irritation.

Scar recovering

Alkanna root extract can heal scars. Alkanna root has many health benefits, such as providing protection from microbial infections to

the skin and the reduction of inflammation. Alkanna root is generally treated on burn scars due to its cooling properties that remove heat from the skin and its anti-inflammatory natural ingredients. Alkanna root also works as a sunscreen and relieves sunburns. ⁽¹⁷⁾

Maintaining skin health

The root of alkanna has antiviral and antibacterial properties that may help protect the skin from infections. Alkanna root oil additionally has anti-aging and anti-wrinkle characteristics that would help maintain the health and beauty of the skin by minimizing wrinkles. ⁽¹⁷⁾

Anti-fungal and skin healing

Alkanna root contains anti-fungal properties and can treat skin conditions such as congestion, ringworm, and eczema. ^(23,24)

TRADITIONAL USES

Burns. An early study suggests this ointment, one made with alkanna combined with beeswax and olive oil, may aid a burn in healing somewhat quicker than would a normal therapy. Wounds heal. An early study indicates that the 20% alkanna extract ointment encouraged a wounded area to heal after skin removal for a skin transplant. However, it is still unknown whether the alkanna ointment reduces pain in the wound or the level of scar development. Diarrhea. Skin diseases, when used as sudorific. Ulcers in the stomach. ⁽²⁵⁾

Conclusion

In conducting this holistic review, primary and secondary data related to the taxonomy, origin, distribution, description, phytoconstituents, ethno-Medicinal uses, and pharmaceutical uses of the plant were compiled. With respect to this traditional herb, various ailments were treated with the third true plant into question, but not much of it has actually been validated. More scientific studies should be undertaken to further inquire into the uncharted boundaries of *Alkanna tinctoria*.

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