

## *Linum usitatissimum*: Anti-bacterial Activity, Chromatography, Bioactive Compounds, Applications: A Review

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### ABSTRACT

Flax is a food and fiber crop cultivated in cooler regions of the world. The flowers are pure pale blue, 15–25 mm in diameter, with five petals. The fruit is a round, dry capsule 5–9 mm in diameter, containing several glossy brown seeds shaped like an apple pip, 4–7 mm long. Flax is grown for its oil, used as a nutritional supplement, and as an ingredient in many wood-finishing products. Flax is also grown as an ornamental plant in gardens. Flax fibers are used to make linen. The Latin species name *usitatissimum* means "most useful. The oil is applied externally to treat joint and muscle pains, non-healing wounds, skin disorders. Flaxseed oil also helps in speeding up the healing of skin lesions and has proved very effective for everything acne, psoriasis, eczema, and sunburn. Omega-3 fatty acids offer protection against heart disease by getting to the membrane of body cells and acting as guards that admit only healthy substances and bar damaging ones.

**Keyword:** Biological action, *Linum usitatissimum*, Review, Chromatography, Bioactive compounds, Applications.

### INTRODUCTION

The textiles made from flax are known in the Western countries as linen, and traditionally used for bed sheets, underclothes, and table linen. The oil is known as linseed oil. The plant species is known only as a cultivated plant, and appears to have been domesticated just once from the wild species *Linum bienne*, called pale flax. Cultivated flax plants grow to 1.2 m (3 ft 11 in) tall, with slender stems<sup>1-13</sup>. The leaves are glaucous green, slender lanceolate, 20–40 mm long, and 3 mm broad. Several other species in the genus *Linum* are similar in appearance to *L. usitatissimum*, cultivated flax, including some that have similar blue flowers, and others with white, yellow, or red flowers. Some of these are perennial plants, unlike *L. usitatissimum*, which is an annual plant. Flax fibers are taken from the stem of the plant, and are two to three times as strong as those of cotton. Additionally, flax fibers are naturally smooth and straight. Europe and North America depended on flax for vegetable-based cloth until the 19th century, when cotton overtook flax as the most common plant used for making rag-based paper. Flaxseed and its oil have repeatedly been demonstrated to be nontoxic and are generally recognized as safe for human consumption<sup>14-27</sup>. Flax, like many common foods, contains small amounts of cyanogenic glycoside; these are nontoxic when consumed in typical amounts, but may be toxic in large quantities from consuming staple foods such as cassava. Typical concentrations (for example, 0.48% in a sample of defatted dehulled flaxseed meal) can be removed by special processing.

#### *Biological action*

##### *Inflammation*

The effect of *L. usitatissimum* fixed oil on distinct phases of the inflammatory process: first, an acute phase of local vasodilatation and increased capillary permeability leading to exudation, followed by leucocytes migration<sup>28-32</sup>.

##### *Hepato-protective*

Flaxseed oil is the rich sources of omega 3-fatty acids and is so potent antioxidants. Raw and baked flaxseed products induce hypolipidemic, hypoglycemic and hypocholesterolaemia effects which may be attributed mainly to seed oil rich in alpha linolenic acid.

##### *External Application*

Linseed pastes local application is useful in healing wounds and abscesses faster. It promotes the health of hair and nails and has substances called lignans, which have a beneficial effect on the hormonal system of the body<sup>33</sup>.

##### *Brain health and ADHD*

The essential fatty acids present in flaxseed helps in the transmission of nervous impulses. This makes flaxseed oil very useful for numbness and tingling as well as for preventing serious nerve ailments like Parkinson's and Alzheimer's disease. It is very useful in treating intelligence related disorders such as ADHD. Bipolar disorder, depression, menopausal symptoms.

##### *Hormone supplement*

One important benefit is that flaxseed contains phytoestrogens that can mimic the human sex hormone

Table 1: Major pharmacological activity of *Linum usitatissimum*.

Part of plant	System	Effects	Preparation	Ref.	
oil	Human food and beverage	nutritional supplement	eaten	1	
		as an ingredient in many wood-finishing products	-----	1	
		ornamental plant in gardens	agriculture	1	
		drying oil in paints and varnishes and in products such as linoleum and printing inks	applied	1	
		laxative	-----	16	
		as part of the diet	-----	17	
		pathologies	Hepato-protective	eaten	9
			inflammatory action	eaten	4
			healing wounds		18
			treat joint and muscle pains	applied externally	18
	non-healing wounds			18	
	Pharmacological and biological Activities	skin disorders		18	
		skin lesions	applied	18	
		acne	applied	18	
		psoriasis, eczema, and sunburn	applied	18	
		health of hair and nails	Applied, eaten	18	
		effect on the hormonal system of the body.		18	
		essential fatty acids.		18	
		Parkinson's and Alzheimer's disease.	-----	11	
		ADHD. Bipolar disorder, depression, menopausal symptoms.		11	
make linen.			1		
Stem	fibers	Paper.		1	
Seed		Irritable bowel syndrome. associated with diarrhoea.		16	
				7	
		infertility, impotence, menstrual cramps, endometriosis and menopausal problems.		8	
				6	
		cardiac disorders and cholesterol.		21	
		antianginal, decongestive and hypolipidemic effect.		49	
		Anti-cancerous	eaten	4	
	Anti-inflammatory		49		
	Weak estrogenic and anti-estrogenic activity		52		
	Anti-ulcerogenic action		53		
	Anti-bacterial activity		54		
	Antidiabetic		56		
	Nephroprotective		59		

estrogen. It is use fulf or infertility, impotence, menstrual cramps, endometriosis and menopausal problems.

*Cardio-protective*

It is used in the treatment of cardiac disorders and cholesterol. It acts as a blood thinning agent. Hence, it is useful in preventing andtreating atherosclerosis (cholesterol and clotdevelopment in blood pipes of the heart).

*Pharmacological activities*

*Anti-inflammatory activity*

Some studies investigated the effect of fixed oil present in flaxseed on distinct phases of inflammation. *L. usitatissimum* fixed oil demonstrated a significant dose-dependent inhibition of protein exudation (i.e., the rise in protein concentration in peritoneal fluid) and inhibited the vascular permeability shown by inhibition to dye leakage.

*Anti-estrogenic Activity*

Some studies investigated that potential phytoestrogens isolated from flaxseed significantly stimulate estrogen production in MCF7 breast cancer cells. They also observed a down-regulation of ERβ receptor expression and down-regulation of PR expression in MCF7 cells after treatment.

*Anti-ulcerogenic action*

Some studies investigated the effect of mucilage and fixed oil on the gastric lesions induced by ethanol. Their study provides clear evidence that consumption of the products of flaxseed (oil and mucilage) have gastro-protective effect against ethanol-induced gastric ulcers.

*Anti-bacterial activity*

Studies investigated the effect of flaxseed proteins on the several species of gram positive and gramnegative bacteria.

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