International Journal of Chemical Science
Online ISSN: 2523-2843, Print ISSN: 2523-6075
Impact Factor: RJIF 5.22
www.chemicaljournals.com
Volume 2; Issue 3; May 2018; Page No. 29-32

A classical review on mustard

Pradip Kumar Saini[1*], Bhawana Mathur[2], Brajesh Kumar[3], RK Yadav[4], Shipra pandey[5]
[1, 2, 4, 5] Department of Crop Physiology, Narendra Deva University of Agriculture & Technology, Kumarganj, Faizabad, Uttar Pradesh, India
[3] Department of Agriculture, Banda University of Agriculture and Technology, Banda, Utter Pradesh, India
[1, 2, 4, 5] Department of Home Science& Biotechnology, Narendra Deva University of Agriculture & Technology, Kumarganj, Faizabad, Uttar Pradesh, India

Abstract
Brassica juncea is an Indian mustard. It belongs to family Brassicaceae. The mustard made from the seeds of the *Brassica juncea* is called brown mustard. Which are used for medicinal purpose as well as food, since centuries. Brown mustard plant produces tiny yellow colored flowers, which almost cover the plant. Reported to be anodyne, aperitif, diuretic, emetic, rubefacient, and stimulant, aparfrom the reported use plant is having application in allied field such as kitchen, phytomedicine, general medication for its medicinal value.

Keywords: seed, medicinal uses, chemical composition, mustard etc.

Introduction
Brassica is one of the most ancient spices. It has three varieties namely black, brown and white. Brown mustard is largely cultivated. Brown mustard plant produces tiny yellow colored flowers, which almost cover the plant. The black mustard plant normally grows to a height of 10 feet. White mustard is the most mild among all the varieties of mustard. Mustard Seed has a fresh aroma and slightly biting flavor but when the seeds are dried they do give any fragrance. The leaves, the seeds, and the stem of this mustard variety are edible. The plant appears in some form in African, Indian, Chinese, Japanese, and Soul food cuisine
The mustard made from the seeds of the *Brassica juncea* is called brown mustard. Which are used for medicinal purpose as well as food, since centuries. Ayurvedic Samhita have vividly described the properties and medicinal uses of these two varieties separately. Though they are two separate herbs, more or less, their properties are similar. Charaka has categorized the white variety as asthapanopaga.

Description
The plant is cultivated throughout India, especially in Rajasthan (48%) and Uttar Pradesh. It is a large branching annual, growing up to 0.5-1 meter in height. The leaves broadly ovate, coarsely dentate, the lowest ones lyric and slightly hispid whereas, the upper ones lanceolate, all stalked, dark green in colour. The flowers in corymbose racemes, stalked, bright yellow. The fruits, siliqua, 2.5-5 cm long, oblong-linear. The seeds are brownish-red. *Brassica juncea* and it belongs to family Brassicaceae. The white variety sarshapa is botanically known as Brassica alba. The seeds of Rajika contain 20%-25% stable oil. Brassilexin isolated from leaves and its structure elucidated. Trans Ocimene identified as a major component along with allyl isothiocyanate.
Indian mustard It is a Perennial herb, usually grown as an annual or biennial, up to 1 m or more tall; branches long, erect or patent; lower leaves petiole, green, sometimes with a whitish bloom, ovate to obovate, variously lobed with toothed, scalloped or frilled edges, lyrate-pinnatisect, with 1-2 lobes or leaflets on each side and a larger sparsely setose, terminal lobe; upper leaves sub entire, short petiole, 30-60 mm long, 2-3.5 mm wide, constricted at intervals, sessile, attenuate into a tapering, seedless, short beak 5-10 mm long. Rooting depth 90-120 cm. Seeds about 5,660-6,000 per 0.01 kg (1/3 oz)

Biological Name

English	: Mustard Seeds
Hindi	: Rai / Banarasi Rai / Sarson
Urudu	: Rai, Banarasi Rai, Kalee Sarson
Punjabi	: Rai / Banarasi Rai / Kalee Sarson
Gujarati	: Rai
Tamil	: Kadugu
Malayalam	: Kadugu
Kannada	: Sasuve / Karisasive
Telugu	: Avalu
Bengali	: Sarsay / Shorshe / Rai
Konkani	: Sasaun
Marathi	: Mohori
Oriya	: Sorisa / Sarosha
Tulu	: Sasive
Kashmiri	: Aasur / Sorisa

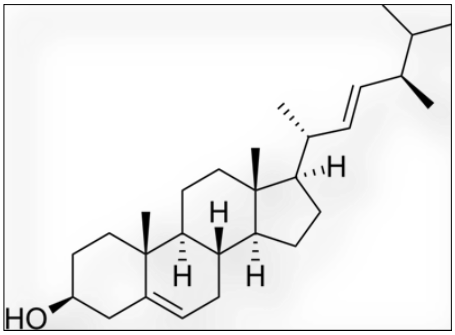
Scientific classification

Kingdom	-Plantae - Plants
Subkingdom	-Tracheobionta - Vascular plants
Superdivision	-Spermatophyta - Seed plants

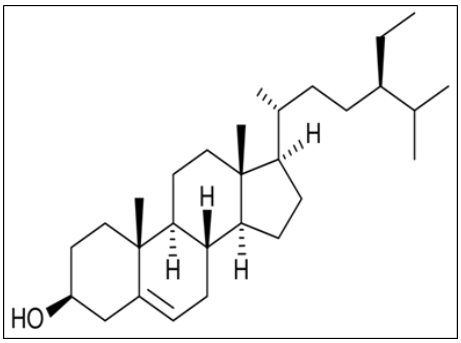
Division	Magnoliophyta - Flowering plants
Class	Magnoliopsida - Dicotyledons
Subclass	Dilleniidae
Order	Capparales
Family	Brassicaceae- Mustard family
Genus	*Brassica* L. - mustard
Species	*Brassica juncea* (L.) Czern. - India mustard

Chemical Composition

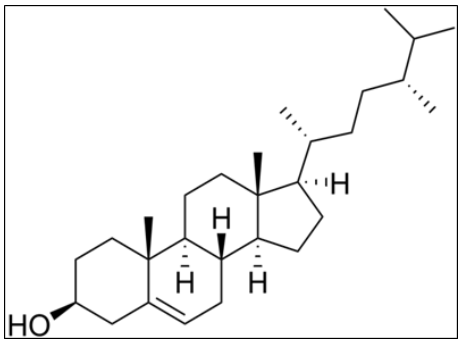
Mustard greens are high in Vitamin A and C, and iron; a cupful (140 gm) providing an adult with ca 60% of his recommended daily Vitamin A requirement, all the Vitamin C requirement and about one-fifth the iron. Per 100 g, the leaf is reported to contain 24 calories, 91.8 g H2O, 2.4 g protein, 0.4 g fat, 4.3 g total carbohydrate, 1.0 g fiber, 1.1 g ash, 160 mg Ca, 48 mg P, 2.7 mg Fe, 24 mg Na, 297 mg K, 1825 g -carotene equivalent, 0.06 mg thiamine, 0.14 mg riboflavin, 0.8 mg niacin, and 73 mg ascorbic acid. Per 100 g, the root is reported to contain 38 calories, 85.2 g H2O, 1.9 g protein, 0.3 g fat, 8.8 g total carbohydrate, 2.0 g fiber, 3.8 g ash, 111 mg Ca, 65 mg P, 1.6 mg Fe, 447 mg K, 45 g -carotene equivalent, 0.05 mg thiamine, 0.12 mg riboflavin, 0.7 mg niacin, and 21 mg ascorbic acid. Per 100 g, the seed is reported to contain 6.2 g H2O, 24.6 g protein, 35.5 g fat, 28.4 g total carbohydrate, 8.0 g fiber, and 5.3 g ash. It also contains Brassilexin Seed sterols contain 19.2% brassicasterol (9.1% esterified), 23.6% free campesterol (34.0% esterified), 57.2% sitosterol (55.2% esterified), 1.7% esterified -5-avenasterol, and a trace of -7-stigmasterol. Contains the glucosinolate sinigrin (potassium myronate) and the enzyme myrosin (myrosinase); sinapic acid; sinapine (sinapic acid choline ester); fixed oils (25 to 37%) consisting mainly of glycerides of erucic, eicosenoic, arachidic, nonadecanoic, behenic, oleic, and palmitic acids, among others; proteins (e.g., globulins); and mucilage (Leung, 1980). Sinigrin on hydrolysis by myrosin (myrosinase) yields allyl isothiocyanate, glucose, and potassium bisulfate. Allyl isothiocyanate is volatile; its yield from B. juncea is 0.25 to 1.4% (usually ca 0.9%). Other minor volatile components that are also set free by enzymatic hydrolysis include methyl, isopropyl, sec-butyl, butyl, 3-butenyl, 4-pentenyl, phenyl, 3-methylthiopropyl benzyl, and -phenylethyl isothiocyanates. [4, 8] Allyl isothiocyanate is irritant, rubefacient and vesicant. It is also lachrymatory and has counterirritant properties when greatly diluted (e.g., 1 in 50). It should not be tasted or inhaled when undiluted. It is one of the most toxic essential oils. Isothiocyanates such as those present in mustard have been implicated in endemic goiter (hypothyroidism with thyroid enlargement). They also have been reported to produce goiter in experimental animals. Allyl isothiocyanate and butenyl isothiocyanate are goitrogenic but are strong antimutagens. Croceten is also an antimutagenic. Volatile mustard oil has strong antimicrobial (bacteria and fungi) properties. Sinigrin has been reported to be toxic to certain insect larvae but harmless to others



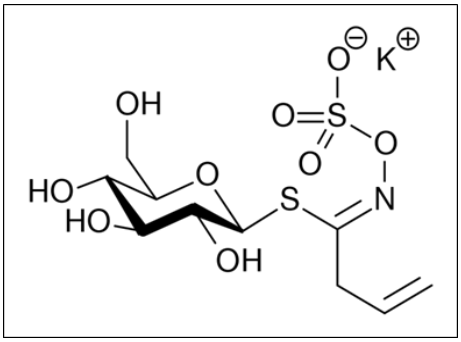
Brassicasterol



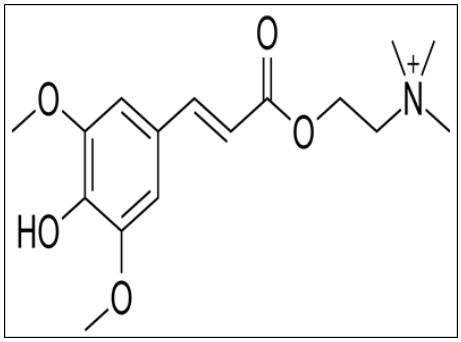
Sitosterol



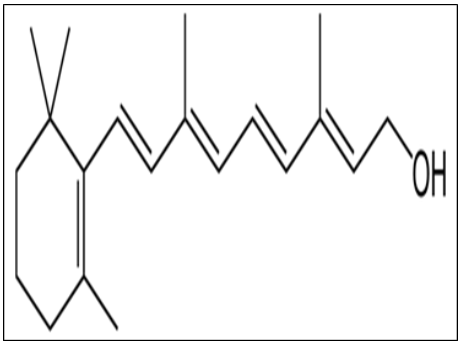
Campesterol



Sinigrin



Sinapine



Vitamin A

Uses

Kitchen Use

Young tender leaves of mustard greens are used in salads or mixed with other salad greens. Older leaves with stems may be eaten fresh, canned or frozen, for potherbs, and to a limited extent in salads. Seed oil is used for cooking purpose. Oil contains 11% saturated and 89% unsaturated fatty acid. Again among unsaturated fatty acid 18% linoleic and 15% linolenic fatty acid. Mustard is used in Indian, French, German and Irish cuisines. Mustard is used in salad dressings, egg dishes,

cheese dishes, pickles and vegetables. Mustard is rubbed over meat before roasting. It is also added to butter to give butter a pleasant flavor.

Medicinal Use

Mustard is used as remedy for the following few problems

Bronchitis: Take mustard tea thrice a day (mix 1 tsp of mustard flour cup in boiling water and leavefor5minutes). Muscular and skeletal pains: It stimulates circulation in pain area and thus help to relieve pain.

Phytoremediation

This plant is used to remove heavy metals from the soil in hazardous waste sites because it has a higher tolerance for these substances and stores the heavy metals in its cells. The plant is then harvested and disposed of properly. This method is easier and less expensive than traditional methods for the removal of heavy metals. It also prevents erosion of soil from these sites preventing further contamination.

Medicinal Uses of Swollen Stem Mustard

The plant is a folk remedy for arthritis, foot ache, lumbago, and rheumatism. The seed is used in the treatment of tumours in China. In Korea, the seeds are used in the treatment of abscesses, colds, lumbago, rheumatism, and stomach disorders. The root is used as a galactagogue in Africa. Ingestion may impart a body odour repellent to mosquitoes. Mustard oil is used in the treatment of skin eruptions and ulcers. Believed to be aperient and tonic, the volatile oil is used as a counterirritant and stimulant. In Java the plant is used as an antisyphilitic emmenagogue. Leaves applied to the forehead are said to relieve headache. The Chinese eat the leaves in soups for bladder, inflammation or haemorrhage.

Table 1

Plant Parts	Uses
Seed	Tumors in China, In Korea, these are used for abscesses, colds, lumbago, rheumatism, and stomach disorders, Hypoglycemic, treatment of blisters in inflammatory neralegic affections and for Obstinate vomiting, antioxidant activity, seed paste is used in backache, arthritis, paralysis, stye.
Leaves	Diuretic, stimulant and stomachic, relieve headache (Burkill, 1966), Muscular and skeletal pains, diaphoretic. Liniment for rheumatic pain Anthelmintic, antidysenteric, diaphoretic, Fever and cold, for bladder inflammation.
Powdered seed oil	Antibacterial activity, internally used for hiccup, augments the appetite, It relieves the phlegm in cough, oil Aphrodisiac, lubricant, hair oil, preservative, counterirritant, emetics in drunkenness and in poisoning, skin eruptions and ulcers (Perry, 1980)., antimutagenic, colic, externally applied for arthritis, antiseptic and anti-inflammatory, seed oil, with salt is an effective gargle in dental infections and pyorrhea.
Roots	A galactagogue in Africa
Total plant	The plant is used as an antisyphilitic emmenagogue, Bronchitis, anorexia, dyspepsia, tumors, worm infestations and splenic disorders.
Dried leaf and flower	A body odor repellent to mosquitoes, dengue fever

Classical Ayurvedic Preparations

Fig 1: Brassica leaves

Fig 2: Brassica silique

Fig 3: Brassica flower

Fig 4: Brassica seeds

Fig 5: Brassica roots

Fig 6: Brassica whole plant

References

1. Alqasoumi S. Carbon tetrachloride - induced hepatotoxicity: Protective effect of 'Rocket' Eruca sativa L. in rats. Am J Chin Med. 2010; 38(1):75-88.
2. Chen BY, Cheng BF, Liu HL, Fu TD. The Chinese mustard (*Brassica juncea*) resources. Cruciferae Newsletter. 1997; 19:7-8.
3. Fomina ZV. Ulan-Ude: Publishing House of Buryatia, 1962, 76.
4. Keller BA. Weed plants of the USSR. 1934; 3:448.
5. Grover JK, Yadav S, Vats V. Hypoglycemic and antihyperglycemic effect of Brassicajuncea diet and their effect on hepaticglycogen content and the key enzymes of carbohydrate metabolism. Mol Cell Biochem. 2002; 241(1-2):95-101.
6. Holland B, Unwin ID, Buss DH. Vegetables, Herbs and Spices. 4th, 1991, 163.
7. Leung AY. Encyclopedia of common natural ingredients used in food, drugs, and cosmetics. John Wiley & Sons. New York, United States, 1980, 250.
8. Sarwar Alam M, Gurpreet Kaur, Zoobi Jabbar, Kaleem Javed, Mohammad Athar. Eruca sativa seeds possess antioxidant activityand exert a protective effect on mercuric chloride induced renal toxicity.Food Chem Toxicol. 2007; 45(6):910-920.
9. Ouyang SW, Zhao KJ, Feng LX, Chye ML, Ram S. [BjCHI1 from *Brassica juncea* displays both chitinase and agglutination activity].Sheng Wu Gong Cheng Xue Bao. 2002; 18(5):572-7.
10. Yadav SP, Vats V, Ammini AC, Grove JK. *Brassica juncea* (Rai) significantly prevented the development of insulin resistance in ratsfed fructose-enriched diet. J Ethnopharmacol. 2004; 93:113-116.
11. Smartt J, Simmonds NW. Evolution of Crop Plants 2nd, 1995, 82-86.
12. Siemonsma JS, Kasem Piluek. Plant Resources of South-East Asia. 1993; 8:104-108.
13. Yokozawa T, Kim HY, Cho EJ, Yamabi N, Choi JS. Protective effects of mustard leaf (*Brassica juncea*) against diabetic oxidativestress. J Nutr Sci. Vitaminol. 2003; 49(2):87-93.