REVIEW OF LITERATURE

_Vigna mungo_ is the important pulse crop found throughout India. Here are some listed works which are considered during present study.

Kiritikar and Basu, (2005) mentioned that _Vigna mungo_ L Hepper, Family: Papilionaceae (Leguminosae-Papilionoideae, Fabaceae) is known as Udid or Black gram. They reported that _Vigna mungo_ is a diffuse annual herb; stem 30–60 cm long, clothed with brownish silky hairs. Leaves 3 foliolate; leaflets 5–10 cm long, flowers yellow in axillary racemes, pods subcylindric; 3.8–6.3 cm long. It is extensively cultivated all over the India. It has been used for various medicinal purposes in Ayurvedic and Unani systems of medicine. The seeds are sweet, laxative, aphrodisiac, tonic, appetizer, diuretic, galactagogue and styptic; useful in piles, asthma, scabies, leucoderma, gonorrhoea, pains, epistaxis, paralysis, rheumatism and affections of the nervous system, liver and cough. It is also prescribed for dropsy and cephalalgia.

Nadkarni, K.M., (2002) mentioned that green pods of Udid are occasionally used as a vegetable. He mentioned that black gram is called as Masha in Sanskrit. The black ripe pulse is split into dal and is most fattening food. Pure black gram cake baked on steam (idli) with ghee is a night diet for diabetics. Medicinally it is employed both internally and externally, internally in gastric catarrh, dysentery, diarrhea, cystitis, paralysis, piles, rheumatism and affections of nervous system, in the form of decoction and externally as poultice, also in gastritis, dysentery and rheumatism.


Anonymous, (1976) reported that Masha is a native of India and is cultivated as a major pulse crop almost throughout India. He reported that the major producing areas are Madhya Pradesh, Uttar Pradesh, Maharashtra, Himachal Pradesh, Punjab, Haryana, Bihar, West
Bengal, Andhra Pradesh, Tamil Nadu, Gujarat, Orissa, Assam, Kerala, Jammu & Kashmir, Karnataka and in some parts of Delhi

**Chatterjee and Pakrashi, (1992)** mentioned that the roots of *Vigna mungo* are narcotic and are used for aching bones, abscesses and inflammations.

**Sharma, (1978) and B.N., (1982)** reported the Ayurvedic properties of Masha which are as follows

- **Rasa** – Madhura
- **Guna** – Guru, Snigdha
- **Vipaka** – Madhura
- **Veerya** – Ushna
- **Doshaghnata** – Vatashamaka, Kaphapittashamka

- **Karma** – Snigdha, Ruchya, Rochana, Vataghna, Sransana, Santarpana, Balya, Shukrala, Brihhana, Malabhedana, Vedanasthapana, Nadibalya, Madaka, Purishajanana, Shoolaprashamana, Yakriduttejaka, Mooralra, Vrishya, Stanyajanana, Artavajanana, Indriyaprasadana, Jeevaneeya, Medovardhana

**Anonymous, (2003)** mentioned the phytochemical analysis of black gram. He mentioned the seeds consist of moisture 10.9g/100gm, proteins 24 g/100gm, Fats 1.4 g/100gm, Fibers 0.9 g/100gm, Carbohydrates 59.6 g/100gm and minerals 3.2 g/100gm. Among the other substances reported to be present in the seeds and seedling of black gram mention may be made of allantoin, glutathione, plant growth regulators and lignin precursors. A saponin is reported to be present in the seeds.

**Gopala Krishna et al. (1997)** studied the tocopherol and tocotrienol composition of the Indian pulses Bengal gram (*Cicer arietinum* L.), blackgram (*Vigna mungo* L.), green gram (*Vigna radiata* L.), and horse gram (*Dolichos biflorus* L.) They extracted the oil from black gram and showed it contain high amount of tocopherol (742mg/100g) while fatty acid composition of the fat extracted showed substantial amount of unsaturated fatty acids (82.9%) They showed that 3.8to 49.1% linolenic acid is present in the fat.
Mahajan et al., (1988) studied the dehulled and defatted flour of urdbean (*V mungo*), and showed that it contain 25% protein with maximum contribution by globulins (63%). They showed Albumins and glutelins contributed 12% and 21% respectively, whereas prolamins were present only in traces (1%). They have done amino acid analysis of all fractions and they reported that glutamic acid was present in maximum concentration followed by aspartic acid and lysine. Just like other pulse proteins, the urdbean proteins were also deficient in sulphur containing amino acids. The urdbean protein are deficient in sulphur containing amino acids.

Lee et al. (1999) analysed the saponins from black bean (*Vigna mungo L. Hepper*) using positive and negative ion fast atom bombardment mass spectrometry (FAB-MS) and liquid chromatography/mass spectrometry. They used Methanol to extract the saponins from defatted black bean, which was partially purified by extraction with n-butanol, and the extract was dialyzed with 3000 M(r) cut-off tubing. They analyzed dialyzate by using mass spectrometry. They showed the black bean shell and the root of black bean sprout, consist the saponins of soyasaponin I, soyasaponin II, soyasaponin V, saponin A, saponin B, acetylsoyasaponin A(4) and soyasaponin beta(g). Moreover, all the studied saponins were found in the stem and leaves of the black bean sprouts, except soyasaponin beta(g) and acetylsoyasaponin A(4), respectively.

Kotiguda et al., (2006) detected hexasaccharide ajugose, alpha-D-galactopyranosyl-(1-->6)-alpha-D-galactopyranosyl-(1-->6)-O-alpha-D-galactopyranosyl-(1-->6)-alpha-D-galactopyranosyl-(1-->6)-alpha-D-galactopyranosyl-(1-->6)-alpha-D-glucopyranosyl-(1<-->2)-beta-D-fructofuranoside, generally uncommon in legumes, in the seeds of *Vigna mungo* L. by using TLC and paper chromatography. They isolated Ajugose by silica gel chromatography and its structure was established by acid and enzymatic hydrolysis, fast atom bombardment mass spectrometry and both one- and two-dimensional 1H and 13C NMR techniques.

Indira and Kurup, (2008) showed that the hypocholesterolemic action of neutral detergent fiber (NDF) from blackgram (Phaseolus mungo) in rats may be due to hemicellulose, since removal of hemicellulose resulted in the loss of cholesterol-lowering action. They studied Blackgram NDF and it showed different binding affinities for different bile acids, with maximum binding observed with chenodeoxycholic acid, and minimum binding with deoxycholic acid. They found that absorption of glucose and cholesterol was lower in rabbits fed blackgram NDF than in rabbits fed a fiber-free diet. They also studied In vitro significant
binding of inorganic cations and bile acids by blackgram NDF. Cholic acid may be adsorbed on the surface of blackgram NDF.

**Thomas et al., (2008)** maintained rats on cholesterol-free diet and fed neutral detergent fiber (NDF) from blackgram and it showed the lower concentrations of cholesterol in the serum, liver and aorta, when compared to those fed isocaloric, fiber-free diet. They Incorporated labeled precursors, [1,2(-14)C]acetate and [U-14C]glucose, into cholesterol of liver and found that it was higher in these rats. They showed that the activity of hepatic hydroxymethylglutaryl coenzyme A (HMG-CoA) reductase was also increased. Concentration of cholic acid and chenodeoxycholic acid in the liver was also more in rats fed blackgram NDF. The decreased concentration of cholesterol in the tissues may be due to its higher rate of hepatic degradation to bile acids.

**Bhat et al., (1981)** studied 22 tubers and 9 pulses and screened for inhibitors of enterokinase activity and their studies showed that the *P. mungo* contained enterokinase inhibitory activity.

**Kaushik et al., (2008)** showed normal and alloxan-induced diabetic guinea pigs given whole seed diet of black gram for 4 weeks and they showed appreciable lowering of blood glucose, serum total lipids, and triglycerides and esterified portion of cholesterol. Total cholesterol/phospholipids ratio also decreased indicating the atherogenic nature of *P. mungo*

**Solanki and Jain, (2010)** studied immunostimulatory effects by using measures of sheep red blood cells (SRBC)-induced humoral antibody titer, SRBC-induced delayed-type hypersensitivity (DTH), neutrophil adhesion, and in vivo Phagocytosis (via the carbon clearance method) after host treatment with the extract. They showed that primary and secondary antibody titers in the rats were significantly increased by treatment with the *V. mungo* extract as compared with those noted among rats in a control group. The findings in this study suggest that *V. mungo* seed extract possesses profound immunostimulatory activities.

**Minhas Salman (2006)** mentioned the seed flour of *Vigna mungo* swells and form gelatinous mass when it comes in contact with water due to its hydrophilic nature. It is used as a binder in the preparation of batter for cooking “Imarti (Jahangiri)” in south India. Under the Mughals in South Asia, sometimes in the building of bridges use was made of lentils/daals
such as Urad daal which is a sticky daal and acted as a binder and strengthening material due to large quantity of polysaccharides

**Wang et al., (2005)** isolated novel lysozyme exhibiting antifungal activity and with a molecular mass of 14.4kDa in SDS-polyacrylamide gel electrophoresis from mung bean (Phaseolus mungo) seeds using a procedure that involved aqueous extraction, ammonium sulfate precipitation, ion exchange chromatography on CM-Sephadex, and high-performance liquid chromatography on POROS HS-20. They showed that N-terminal sequence was very different from that of hen egg white lysozyme & Its pI was estimated to be above 9.7. The specific activity of the lysozyme was 355U/mg at pH 5.5 and 30 degrees C. The lysozyme exhibited a pH optimum at pH 5.5 and a temperature optimum at 55 degrees C. They reported for the first time, that a novel plant lysozyme exerted an antifungal action toward Fusarium oxysporum, Fusarium solani, Pythium aphanidermatum, Sclerotium rolfsii, and Botrytis cinerea, in addition to an antibacterial action against Staphylococcus aureus.

**Rehman and Shah, (2001),** studies were aimed to ascertain the effects of soaking black grams (Cultivar AARI-5732) in different salt solutions at different temperatures and different time periods, and different methods of cooking on the tannin content and protein digestibility. They showed that the tannin content of black grams was reduced to various extents by soaking at 30 degrees and 100 degrees C for different time periods. However, soaking at 100 degrees C increased the rate of extraction and reduced the extraction time of tannins. They showed that Soaking black grams in water at 100 degrees C reduced tannins by 22.14% in 45 minutes whereas about 2.5 times more tannin was reduced after soaking in sodium bicarbonate solution with or without sodium chloride. Maximum improvement in protein digestibility was also observed after soaking black grams in sodium bicarbonate solution. Tannin contents were further reduced along with improvement in protein digestibility as a result of cooking.

**Singh and Rao (1991)** showed Black gram (Vigna mungo) seeds contain a lectin with certain unusual features. They studied and showed that the lectin agglutinates only trypsinized red cells, and its sugar specificity is complex as none of the common sugars, oligosaccharides or complex polysaccharides exhibit any affinity for the lectin. The purified lectin has a molecular weight of 58 kDa and is a monomer. They showed that unlike other plant lectins, antibodies to the *P. mungo* lectin do not exhibit any immunological cross reactivity. The clot forming ability of the lectin is unusual in that the clot once formed is
rapidly disaggregated indicated that it induces, as yet undefined, certain membrane alterations.

Mishra, (2003) mentioned that the Black gram is Ahar Rasayana type drug.

Cheung and Wong, (2009) isolated three trypsin-chymotrypsin inhibitors from seeds of the black gram (*Vigna mungo*) with a procedure that entailed cation exchange chromatography on SP-Sepharose, anion exchange chromatography on Q-Sepharose, ion exchange chromatography by fast protein liquid chromatography (FPLC) on Mono Q and Mono S, and gel filtration by FPLC on Superdex 75. They made adsorption of two of the trypsin-chymotrypsin inhibitors on the first four types of chromatographic media. The trypsin inhibitory activity of the inhibitors was attenuated in the presence of the reducing agent dithiothreitol. The remaining inhibitor was unadsorbed on SP-Sepharose but adsorbed on Q-Sepharose, Mono Q and Mono S. The protease inhibitors did not exert any inhibitory effect on hepatoma (Hep G2) and breast cancer (MCF 7) cells or antifungal action toward Botrytis cinerea, Fusarium oxysporum and Mycosphaerella arachidicola. They showed that two of the inhibitors slightly inhibited the activity of HIV-1 reverse transcriptase, with an IC50 in the millimolar range.

Soetan, (2008) review showing that saponins are reported to have anti-ageing activity which is related to their free radical scavenging action. He also reported that saponins improve learning processes and memory retention in experimental animals Saponins also inhibited lipid peroxide formation in tissues and elevated the blood and brain superoxide dismutase activity. He reported the active oxygen-scavenging activity of saponins.

Reddy et al., (2006), studied the transverse section of infected stem of urdbean and it showed well developed cortex layer which was three times thicker than that of healthy leaf. The epidermal cells of infected tissue were significantly bigger than in healthy leaf. The number of vascular bundles increased in infected stem. Study showed that the diameter of xylem vessels (metaxylem and protoxylem) increased significantly over healthy vessels. There was significant increase in number of layers of parenchyma cells and cambial cells and diameter of phloem parenchyma in diseased plant compared to healthy stem.

Saini et al., (2003) Reported the production of morphologically normal and fertile transgenic plants from cotyledonary-node explants inoculated with Agrobacterium tumefaciens carrying
binary vector pCambia2301, the latter of which contains a neomycin phosphotransferase (nptII) gene and a beta-glucuronidase (GUS) gene (uidA) interrupted with an intron. They tested the transformed green shoots, selected and rooted on medium containing kanamycin, shown positive for nptII and uidA genes by polymerase chain reaction (PCR) analysis. They established shoots in soil and grown to maturity to collect the seeds. Mechanical wounding of the explants prior to inoculation with Agrobacterium, time lag in regeneration due to removal of the cotyledons from explants and a second round of selection at the rooting stage were found to be critical for transformation.

Nair et al., (1997) studied the external application of “Mahamasa taila” in which Phaseolus mungo is one of the main ingredients along with internal administration of the drug Ekangeveera rasa was proven effective in poliomyelitis management of post polio residual paralysis with certain other Ayurvedic formulations.

Nair et al., (1987) studied the effects of "Masha taila" in which "Phaseolus mungo" the main ingredient during clinical trials on hemiplegic patients by monitoring some important biochemical parameters which have clinical significance to the condition. They found that Masha taila significantly decreased gastric acidity, peptic activity, total serum cholesterol and elevated high serum lipoprotein (HDL) fraction