CHAPTER-III DESCRIPTION OF SELECTED PLANTS

3.1 INTRODUCTION TO LEGUMINOSAE FAMILY

Fabaceae or Leguminosae is a large and economically important family of flowering plants which is commonly known as the legume family, pea family, bean family or pulse family. The name 'Fabaceae' comes from the defunct genus *Faba*, now included into *Vicia*. *Leguminosae* is an older name still considered valid, and refers to the typical fruit of these plants, which are called legumes.

Fabaceae is the third largest family of flowering plants behind Orchidaceae and Asteraceae, with 730 genera and over 19,400 species, according to the Royal Botanical Gardens. The largest genera are *Astragalus* with more than 2,000 species, *Acacia* with more than 900 species, and *Indigofera* with around 700 species. Other large genera include *Crotalaria* with 600 species and *Mimosa* with 500 species. *Vigna* genus also comes under Leguminosae family and has got many traditional usages.
3.2 TYPES OF VIGNA GENUS PLANTS

- Vigna aconitifolia
- Vigna angularis
- Vigna caracalla
- Vigna debilis
- Vigna dinteri
- Vigna lanceolata
- Vigna luteola
- Vigna marina
- Vigna maritima
- Vigna mungo
- Vigna parkeri
- Vigna radiata
- Vigna unguiculata
3.3 TAXONOMICAL CHARACTERISATION AND DESCRIPTION OF SELECTED PLANTS:

Fig: 3.01 Photos of *Vigna mung*Linn plant and seeds

3.3.1 Taxonomical/Scientific classification Of *Vigna mung* Linn

- **Kingdom**: Plantae
- **Subkingdom**: Vascular plants
- **Division**: Magnoliophyta
- **Class**: Magnoliopsida
- **Subclass**: Rosidae
- **Order**: Fabales
- **Family**: Fabaceae
- **Genus**: Vigna
- **Species**: Mung
Morphological characters:\n
**Plant type** : *Vigna mung*

**Origin** : India

It is an erect, hairy plant, varying in height from 30 to 90 cm, sometimes long & twinning cultivated as a pulse crop nearly throughout India.

**Fig: 3.02 Photos of Vigna radiata Linn plant and seeds**
3.3.2 Taxonomical characterization of *Vigna radiate* Linn

**Kingdom** : Plantae

**Subkingdom** : Vascular plants

**Division** : Magnoliophyta

**Class** : Magnoliopsida

**Subclass** : Rosidae

**Order** : Fabales

**Family** : Fabaceae

**Genus** : Vigna

**Species** : Radiata

**Morphological characters**:

**Plant type** : *Vigna radiata*

**Origin** : India

**Plant type** : It is an erect or sub-erect annual, cultivated almost throughout India.
Fig: 3.03 Photos of *Vigna ungiculata* Linn plant and seeds

3.3.3 Taxonomical characterization of *Vigna ungiculata* Linn$^4$:

Kingdom : Plantae

Subkingdom : Vascular plants

Division : Magnoliophyta

Class : Magnoliopsida

Subclass : Rosidae

Order : Fabales

Family : Fabaceae

Genus : Vigna

Species : Ungiculata

Origin : Bangladesh
Morphological characterisation:\(^5\):

Plant type : An erect or sub-erect cultivated twice annually in almost all parts of India.

3.3.4 Cultivation requirements for the growth of *Vigna* genus plants\(^6\):

Zones : Tropical areas – with stands light frost or short cold spells down to 32\(^0\)C if kept fairly dry.

Rate of growth : Medium

Light requirements : Full sun

Climate & soil : These genus plants are mainly cultivated in India, Thailand, Philippines, Indonesia, Burma, Bangladesh and China, but also in hot and dry regions of South Europe and Southern USA. In India and Bangladesh, they are grown during two seasons. One is the Rabi season (starting November), and the other is the Karif season (starting June). They are cultivated as tropical (or sub-tropical) crops, and require warm temperatures (optimally round 30-35\(^0\)C). Well drained loamy soil is best for the cultivation of *Vigna* genus plants. Seeds are sown by either broadcasting or ploughed in rows. It is usually sown mixed with other crops, such as jowar, bajra or cotton. It is believed to have same restorative effect on the soil.

**Collection**: After drying pods will automatically bursts up and the seeds can be collected.
3.4 TRADITIONAL USES OF VIGNA SPECIES: 

This genus seeds are said to be a traditional source, used in treatment of paralysis, for weight reduction, rheumatism, cough, fever and liver ailments.

**Vigna marina:**

This is used in fractured bone, remedy for food poisoning, to treat weakness after child birth, in the treatment of head ache, to cure stomachache. This herb is used to treat mouth infections and abscesses.

**Vigna philosa:**

Roots are bitter, sweet and can be used as aphrodisiac, germicidal. They are used for treating cough, fever, diarrhea, hemoroids, opthalomapathy, burning sensation, dyspepsia, violated condition of vatta, pitta, and kapha.

**Vigna radiate:**

It is employed as light diet during fever, as a cooling agent, as an astringent. Pulses were prescribed for vertigo. A decoction of seeds is used as an effective treatment for Beri-Beri. The *V.mung* extract is said to be protective and curative properties in poly neuritis granuloma.
**Literature Review**

*Vigna unguiculata:*

Roasted seeds are used to treat Neuritis, Insomnia, weakness of memory, Indigestion, Dyspepsia, sensation of pins and needles in limbs, periodic palpitation, Congestive Cardiac Failure (CCF) etc. It is an excellent medicine for stomatitis, corneal ulcers, colic diseases, Kwashiorkar, Marasmus. Decoction of leaves is used to treat hyperacidity, nausea and vomiting.

*Vigna vexillata:*

Seeds contain L-Dopa, a medicine for parkinsons disease.

*Vigna mung:*

Used in liver disorders, rheumatism, infection of nervous system. Root is said to be narcotic and is used as remedy for aching bones, black gram is considered as diuretic and is used in dropsy and cephalgia. *V.mung* leaf extract were used as wound healing agent. *V.mung* Bean is a traditional food source of our Indian people. Vitamins, calcium, irons, phosphorus ratio higher than crude rice. So it has got good values both as food and medicine.
3.5 PREVIOUS WORK REPORTED ON VIGNA SPECIES:

Phytochemical review

1. Florencio E. Podest. A, has done work on *Vigna radiate* Linn seeds and purified an enzyme known as phosphoenolpyruvate phosphatase (PEP) from germinating mung beans.

2. Suseelan K N, *et al* has worked on Blackgram (*Vigna mungo* L) seeds contain two galactose-specific lectins, BGL-I and BGL-II. BGL-I was partially purified into two monomeric lectins which were designated as BGL-I-1 (94 k Da) and BGL-I-2 (89 k Da).

3. Joseph C. Onyilagha *et al* has made a survey of the biochemical constituents of 11 species of *Vigna* indicates the absence of the non-protein amino acid canavanine in their seeds, and absence of proanthocyanidin (polyphenol) in their leaves.

4. Kite GC, *et al* worked on comparative phytochemical studies on legumes using hyphenated technique like GC-MS and LC-MS isolated some aliphatic compounds from the seed of o-acetylethanolamine, 1-triacontanol.

5. Hayman AR isolated Flavonoids from the seeds *Vigna mariana*: Aureol, coumestrol, cyclokievitone, dalbergioidin, 2,3-dehydrokievitone, 5-deoxykievitone, genistein, 2-hydroxygenistein, isovitexin, kievitone, myrtillin, phaseol, phaseollidin, vitexin.
6. Kasai T isolated some compound from the seeds *Vigna radiata*: β-sitosterol, stigmasterol, soyasapogenol C, 1,4-butanediamine, 3-(carboxymethyl amino) propanoic acid, 1H-Imidazole, Spermidine, Spermine, amino acids and peptides \(^{13}\)

7. Takeuchi *et al* has done the interconversion of (-)-quinic acid and 3-dehydro quinic acid, which has been extracted from black gram sprouts. \(^{14}\)

8. Singh and Rao *et al* isolated lectin from the seeds, it get agglutinates only in trypsinised red cells and its sugar specificity complex as none of the common sugars is oligosaccharides or polysaccharides exhibits affinity with it. \(^{15}\)

9. Pandey *et al* isolated anthocyanin delphinidin-3-glucoside, while the purple red hycotyl contains cyanidin-3-glucoside. \(^{16}\)

10. Akihisa *et al* isolated several sterols, 24-Epiclerosterol, three \(\Delta8(14)\)-sterols, four \(14\alpha\)-methyl and sitosterol as the principal constituents. \(^{17}\)

11. Quinic acid has been detected from green gram seedlings, coumesterol the simplest naturally occurring coumestan and of particular interest because of its pronounced oestrogenic property is present in germinated seedlings. \(^{18}\)

12. Narayan *et al* has substituted green gram extract instead of corn step liquor in the production of pencillin. \(^{19}\)

13. Malhotra O P has isolated and characterized an enzyme known as phosphoenol pyruvate phosphatase from germinating mung beans. \(^{20}\)
14. Green gram is poor source of calcium; it is rich in iron and phosphorus. Germination increases the amount of availability of iron and also decreases the phytin phosphorus.²¹

15. Occurrence of phosphoglucomutase in the seeds has been demonstrated. phosphoglucone isomerase present in the seed (also in leaves, stems, roots) brings an equilibrium between glucose-6-phosphate and fructose 6-phosphate.²²

16. Two starch metabolizing enzymes phosphorylase and Q-enzyme have been isolated from aqueous extracts of green gram seeds.²³

17. A proteinase has been isolated in crystalline form from green gram seeds.²⁴

18. A trypsin inhibitor is present in all parts of the plant—seeds, leaves, stems and roots.²⁵

19. Nucleo proteins have been reported to occur in seeds.²⁶
Pharmacological Work

1. Stephen M. Bovie *et al* has evaluated estrogenic activity using an estrogen-dependent MCF-7 breast cancer cell proliferation assay in seven legume extracts containing phytoestrogens\(^{27}\).

2. YogendraSing B. solanky has made a work to evaluate any immunostimulatory activities of the extract of *V. Mung* seeds in an animal model\(^{28}\).

3. Reena Randhir, Yuan has worked on “phenyl propanoid pathway” (PPP) which was stimulated in *V. Mung* bean sprouts through the pentose phosphate and shikimic acid pathways, by natural elicitors such as fish protein hydrolysates (FPH), lactoferrin (LF) and oregano extract (OE)\(^{29}\).

4. Perumal Siddhuraju has worked on the antioxidative properties and total phenolic contents of two varieties of cowpea (*Vigna unguiculata*) were extracted with 70% acetone, the extracts were freeze-dried and examined\(^{30}\).

5. Perumal siddhuraju has worked on the two different extracts of *Vigna unguiculata* for its antioxidant activity using DPPH model, Ferric reducing activity using acetone and ethanolic extract\(^{31}\).

6. Urd *V. Mung* is much valued medicine, used in rheumatism, infections of nervous system & disease of liver and reported to be used as a remedy for aching bones.\(^{32}\)
7. Pulses showed marked cholesterol lowering effect, when fed to rats receiving normal or hypercholesterolemic diet, serum phospholipid levels are also lowered \(^{33}\).

8. Dilwari et al has screened *V. Mung* been extracts used in rheumatism and its roots are considered narcotic. It also proved to possess hypoglycemic action\(^{34}\).

9. Narayana et al used black gram flour, as a supplement to culture media in streptomycin fermentation\(^{35}\).

10. Baveja et al has done formulated a new drug using black gram flour contains mucilage which has the ability to sustain the release of freely soluble drug\(^{36}\).

11. Chung IM et al conducted a study to evaluate protective effect of organic solvent fraction from the seeds of *Vigna radiate* against antioxidant mechanism\(^{37}\).

12. Reen Randhir et al has done antimicrobial and antioxidant activities in dark germinated *V. Mung* bean sprouts by stimulation of phenolics in response to peptide and phytochemical elicitors\(^{38}\).

13. Pulse is used for treating vertigo in philippines, a decoction of seeds is used as diuretic in Beri-Beri and also in the treatment of poly neuritis\(^{39}\).
3.6 REFERENCE:


