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Review on Cytological Characteristics and Health Benefits of Mung Bean (Vigna radiata L. Wilczek)

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Abstract: *Mungbean (Vigna radiata L. Wilczek) is economically most important crop of Vigna group. It is also known as green gram, golden gram, moong. In anatomical characters, paracyctic type of Stomata was observed on both surfaces of laminae. The opposite system of two Vascular bundles was observed in the midrib. The vascular bundles of stem were Showed continuous circular ring. The vascular bundles of petioles, lamina, Midribs and stems were collateral type. The vascular bundles of roots were found Tetrarch to polyarch. Studied on seeds and sprouts of mung bean (Vigna radiata), a common food, contain abundant nutrients with biological activities. This review provides insight into the nutritional value of mung beans and its sprouts, discussing chemical constituents that have been isolated in the past few decades, such as flavonoids, phenolic acids, organic acids, amino acids, carbohydrates, and lipids.*

Keywords: *Vigna radiata*, paracyctic, mung been, flavonoids

I. INTRODUCTION

Mung bean (*Vigna radiata*) is a plant species of Fabaceae and is also known as green gram. It is Sometimes confused with black gram (*Vigna mungo*) for their similar morphology, though they are two different species. The green gram is an annual vine with yellow flowers and fuzzy brown pods. There are three subgroups of *Vigna radiata*, including one cultivated (*Vigna radiata subsp. radiata*) and two wild ones (*Vigna radiata* subsp. *sublobata* and *Vigna radiata* subsp. *glabra*). It has a height of about 15–125 cm (5.9–49.2 in). Mung bean has a well-developed root system. The lateral roots are many and slender, with root nodules grown. Stems are much branched, sometimes twining at the tips. Young stems are purple or green, and mature stems are grayish-yellow or brown. They can be divided into erect cespitose, semi-trailing and trailing types. Wild types tend to be prostrate while cultivated types are more erect. Leaves are ovoid or broad ovoid, cotyledons die after emergence, and ternate leaves are produced on two single leaves. The leaves are 6–12 cm long and 5–10 cm wide. Racemeswith yellow flowers are borne in the axils and tips of the leaves, with 10–25 flowers per pedicel, self-pollinated. The fruits are elongated cylindrical or flat cylindrical pods, usually 30–50 per plant. The pods are 5– 10 cm long and 0.4–0.6 cm wide and contain12–14 septum-separated seeds, which can be either cylindrical or spherical in shape, and green, yellow, brown, or blue in color. Seed colors and presence or absence of a rough layer are used to distinguish different types of mung bean.

II. MATERIALS AND METHODS

Observational design:

The current study is designed for the mutagenic effects on seeds and seedling of selected plant species(*Vigna radiata*) which will be as per the following steps and methods.

Mutagen: Chemical mutagenic methods were prefer for current research work in combination of various modified treatments methods given by Richa sharma,et al(2015), Imran Javed,et al(2016), Imran Javed,et al(2016), C. S. Mahto,et al(2018)Amol vikhe,et al(2020), Ample chandrakant vikhe,et al(2021),V. Prabakaran,et al(2023), S Sofia,et al(2020)

III. RESULT AND DISCUSSIONS

Richa sharma, *et al.*, (2015) studied on gram (*Vigna radiata* L.) of the family Leguminosae is an important legume crops in the semi-arid tropics and study was carried out to improve crop yield of two varieties of green gram de Markiv

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and Smart to determine the effects of sodium azide (10, 20, 30, 40 mM). The LD, value was obseobser30mb30mM of sodium azide. For inducing mutation various concentration viz., 10, 20, 30 and 40mM @ four hours were applied to 100 seed sample of each concentration and one respective control. The morphological and yield characters showed significant increment in seed germination, plant height, number of leaves, number of branches per plant, 50 per cent of flowering, number of nodules per plants, number of pods per plant, numbers of clusters per plant, number of grains per pod, 100 seed weight at lower concentrations. At higher concentration of sodium azide phenotypic, biochemical and yield characters spontaneously decreased. Present investigation concluded the lower concentration of sodium azide (upto 20 mM) performs positively and improved growth and yield parameters studied.

Amol vikhe, *et al.*, (2020) studied on the chemically treated seeds with Sodium Azide (SA) Co60 from BARC, Mumbai were used for the Mutagenic studies in *Vigna radiata* Cultivar-Naval. The seeds were treated with different doses with time intervals, then sowed in the field along with control to study seedling height, seedling injury, pollen sterility, lethality and plant survival at maturity in M1 generation. The sensitivity of the mutagens was studied on parameters. The results were obtained significantly. The higher dose of treatment showed maximum seedling injury and lethality in each mutagenic treatment compared to control.

Ample chandrakant vikh *et al.*,(2021) studied in present investigation an attempt was made to induce mutation with mutagens namely Sodium azide (SA).were studied in M2 generation of *Vigna radiata* (L.) Wilczek Cultivar-Naval to study different morphological mutations. The results indicated induction of a wide spectrum of morphological mutations in cultivar-Naval. The frequency of morphological mutations was variated and significant in mutagenic treatments. The cultivar-Naval was found to be more sensitive SA.

C. S. Mahto, *et al.*, (2018)studied on present experiment assesses the relative effectiveness and efficiency of widely used chemical mutagens on two well adapted varieties of Mungbean namely Pusa Vishal and SML-668 which was treated with 3 different doses of Sodium azide (0.06, 0.08, and 0.1%).Sodium azide (SA) was found to be more effective mutagen to produce high frequency of chlorophyll mutations followed by EMS. It was also found that the lower concentrations of both mutagens were most effective in both the varieties.Sodium azide exhibited gradual decrease in mutagenic efficiency with the increasing concentration or doses with respect to seedling injury and lethality.

V. Prabakaran, *et al.*, (2023) studied on Induced mutagenesis was carried out in an important protein rich pulse crop (Vigna radiata (L.) Wilczek). The seeds of green gram variety Co-6 were treated with different concentrations of sodium azide. The mutagen treated seeds were sown in the field to observe M1 characteristics. The sodium azide treated seeds were subjected to amino acid analysis. Totally 19 amino acids were recorded in control and sodium azide treated samples. In the process of sodium azide treatments a few amino acids were increased and some amino acids were decreased than control. The M1 parameters such as germination and survival percentage, plant height, days taken for flowering, number of pods/plant, length of pods, number of seeds/pod and hundred seeds weight were decreased with increasing concentrations sodium azide and all the growth parameters showed negative trend when compared to control.

Imran Javed, *et al.*, (2016) studied on Mungbean (*Vigna radiata* L. Wilczek) is one of the famous legume crops. The grain yield of mungbean is affected by various biotic and abiotic factors. The yield can be increased by improving the genetic makeup and incorporating the resistance against the environmental stresses. Common breeding methods are not useful in enhancing production of mungbean because of low genetic variability. The production can be improved by improving the available genotypes through mutation or by using other advanced breeding methods.

S Sofia, *et al.*,(2020) Studied on seeds of two mungbean varieties viz., WGG-42 and LGG-460 were treated with various Dose of sodium azide (1 mM, 2 mM and 3 mM) for studying the effect of the mutagens on seedling emergence (%), seedling survival (%), seedling height (cm), pollen fertility (%) and seed fertility (%) in M1 generation. The increasing dose/ of mutagens, decreased seedling emergence (%), seedling survival (%), seedling height (cm) and pollen fertility (%) in both the varieties of mungbean. The reductions in all these traits were observed to be more prominent in SA treatments The variety WGG-42 was found highly sensitive to various mutagens when compared with LGG-460.

Amir Siahpoosh, *et al.*,(2015)studied on, anatomical features of the stem, petiole, leaf and flower of *Vigna radiata* L. (ML2017 Genotype) belonging to Fabaceae family (Subfamily Papilionoideae) were examined. Basic structure of a dicotyledonous plant is showed in stem and petiole Their transverse section consists of epidermal and collenchymas

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layers, cortical layer (parenchyma cells and pericyclic fiber) and stele (vascular bundles, secretory cells and pith); however there are differences in shape and position of vascular bundles. In the stem, this bundles located on a continuous ring but in the petiole are cutting and divided into two large adaxial and three abaxial bundles forming main folaire trace, above which lie laterally a pair of secondary bundles. In the leaf is important the number of mesophyll palisadic and spongy layers, stomatal type (paracytic) and stomata density(48.3%). The secretary cells are in the stem, petiole and leaf. The flower structure is pantamerous with 5 sepals, 5 petals (standard, wings and keel) androecium is of diadelphous and gynocium one carpel and ovary one locule with marginal placentation. In general anatomical charecteristics are very important and could be used in diagnostic key of taxa at all taxonomic levels.

Dongyan Tang, *et al.*, (2014)studied on seeds and sprouts of mung bean (*Vigna radiata*), a common food, contain abundant nutrients with biological activities. This review provides insight into the nutritional value of mung beans and its sprouts, discussing chemical constituents that have been isolated in the past few decades, such as flavonoids, phenolic acids, organic acids, amino acids, carbohydrates, and lipids. Moreover, we also summarize dynamic changes in metabolites during the sprouting process and related biological activities, including antioxidant, antimicrobial, anti-inflammatory, antidiabetic, antihypertensive, lipid metabolism accommodation, antihypertensive, and antitumor effects, etc., with the goal of providing scientific evidence for better application of this commonly used food as a medicine.

GAO Xiao-Li, *et al.*,(2012)Studied on the morphological structure is the basis of physiological function of plants, leaf is the main organ of

photosynthesis that gives seed yield in mung bean [*Vigna radiata*(L.)Wilczek], so it is necessary to analyze anatomical structure of leaf in different genotypes of mung bean. The objective of this experiment was mainly to study the anatomical structure in the leaves of mung bean genotypes with different photosynthetic capabilities and reactive oxygen metabolisms in the flowering and podding stage, and explore the anatomical structure changes of mung bean during the whole aging process.

The results showed that after the plants flowered, their functional leaves aged gradually from bottom to top. In the aging process, leaf structures gradually senesced, mesophyll cells gradually disintegrated, palisade tissue arrangement tended to disorder, thickness of leaf and palisade tissue, ratio of palisade tissue thickness to leaf thickness tended to decrease. There were significant differences in dynamic changes of leaf structure of mung beans. Compared with low-yield varieties, the leaf structures of the high-yield varieties aged slower and thickness of leaf was thicker, palisade tissue more developed and the structure of organism was closer, and mesophyll cells disintegrated slowly at the late growth stage. The above results indicated that the change in anatomical structure of leaf was closely correlated with the yield, and the genotypes of mung bean with high yield potential had thicker functional leaves and more developed palisade tissue.

Kumar Ganesan, Baojun Xu (2018) Stuied on the seeds and sprouts of mung bean are very common cruise in Asia. Evidence showed that bioactive compounds in mung bean have emerged as an increasing scientific interest due to their role in the prevention of degenerative diseases. All data of in vitro, in vivo and clinical studies of mung bean and its impact on human health were collected from a library database and electronic search.

Botanical, phytochemical and pharmacological information was gathered and orchestrated. Remarkable studies have been demonstrated, showing the enhancement of metabolites in mung bean during the sprouting process, which possesses various health benefiting bioactive compounds. These compounds have been frequently attributed to their antioxidant, antidiabetic, antimicrobial, anti-hyperlipidemic and antihypertensive effect, anti-inflammatory, and anticancer, anti-tumor and anti-mutagenic properties. In this critical review, we aimed to study the insight of the nutritional compositions, phytochemistry, and healthpromoting effects of mung bean and its sprouts. The various curative potential of mung bean provides successive preclinical outcomes in the field of drug discovery and this review strongly recommends that mung bean is an excellent nutritive legume, which modulates or prevents chronic degenerative diseases. Keywords: Mung bean; Nutritional composition; Phytochemistry; Health promoting effects.

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