CHAPTER I

REVIEW OF LITERATURE

Habits of two *P. aurelis* variety varieties of

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I. GENERAL ACCOUNT ON PHASEOLUS AUREUS L. :

The genus Phaseolus comprises about 230 species of which 20 are cultivated for their edible pods and seeds (Zukovskij 1962). However Bailey (1949) is of opinion that after removing the synonymy the number of species may be reduced to 150 to 200. Phaseolus aureus is self pollinated annual leguine crop cultivated in all parts of world under wide variety of climatic conditions.

A) Morphology :

It is twining or erect annual herb (fig.2). The tap root is well developed and bears lateral root system in the top 12.6 cm of soil. The stem is elongated about 18.6 cm in local variety while 22.3 cm in improved variety. The main axis produce about 7 to 10 nodes respectively. It has bushy habit. The internodes are usually short.

The leaves are alternate, trifoliate, somewhat hairy with long petiole with well developed pulvinus base. The stipule are small ovate, acute, minute, lanceolate. The leaflets are ovate entire accuping upto 6 x 4 to 10 x 7 cm and asymmetrical. Flowers are borne in axillary racemes bearing few flowers. The pedicel is short, less than 1 cm long. Calyx bracts are leafy,

ovate as longer as upto 3 to 6 mm long. The corolla may be white or pink 1 to 15 cm long arranged in vexillary manner with 5 petals (one standard, 2 wings & 2 keel) stamens are diadelphous (9 + 1) with uniform, oblong anthers. Style is coiled and with interose lateral stigma. Flowers are self pollinated but crossing may occur. Pods are usually slender and narrow upto 5 t0 10 cm long, usually 6 to 8 seeded, but in imnproved variety it is recorded upto 12 seeds. The seeds are yellow or green they vary in colour, shape and size.

There are two main varieties namely yellow mung and green mung. These are further divided into many cultivers depending upon the pod and seed characters as well as disease resistance or susceptibility. It is used as green vegetables and green shelled or dry pulses. It is not a major supplementry food crop or cash crop but in recent years release of new promising varieties with higher productivity and shorter growth period have attracted the attention of several farmers. As the standard of living rase, people are interested in high quality of vegetables which resulted in increase of cultivation of mung. Now a days with advent of research technique, complete mechanisation of this crop particularly in respect to complete harvesters has the wide spread interest of mung cultivers. The increased acreage in

recent years is also due to release of disease resistant and high yielding varieties and no. of other technological improvements in the fields of weed and pest control.

B) Cultural Practices :

a] **Climate** : It is Kharip crop planted during June and July along the cereal crops and harvested after 3 months. According to requirement the seeds do not germinate in cold soils, warm and moist climate is favourable. In very hot whether during Sept.-Oct, Plants drop off theirs leaves and pods.

b] **Soil** : These plants grows satisfactorlly in the well drainage soil. But practically these are grown on all types of soils from light sandy to heavy clay. However they do not grow well in extremly acid or alkaline soils. It is sensitive to high concentrations of soluble sodium and magnesium salts and also to aluminium and maganese. Clay soils and those which remain cold and wet are unsuitable for growth. In such type of soil there is poor and slow growth. Soil with high organic status will produce more yield. The ideal soil texture for this crop is loam or light silt. Organic matter from manuring and residues of previous crop give better yield. The optimum P^H requirement of this crop for maximum yield is between 5.5 to 6.0

c] **Land Preparation** : Land is ploughed to 6-8 inches and 10-30 tonnes of FYM (farm yard manure) are added acc/to organic status of soil. **Phosphorus and potash** are used in the fertilizers. Depending upon soil conditions 60 and 60-120 units of P_2O_5 and K_2O are added with FYM or 20, 60 and 60-120 units of N, P_2O_5 and K_2O are added without FYM.

d] **Sowing** : In the plans of India phaseolus aureus is sown in two seasons, Kharip (June-Oct.) and Rabi (Nov.-March). The seeds germinate slowly at a soil temp. of 60°F and at low temp. They may not in the soil for optimum growth P^H requirement is form 6 to 7. As the seeds are susceptible for different diseases and pests, these are disinfected using insecticide and fungicide (Dieldrin and Thiram). The depth of sowing varies with the soil conditions. The seeds are usually better sown in light soils, than in heavy soils. In humid regions seeds are sown 1 to 2 cm deep on heavy soils and 2 to 4 cm on light soils. Clean shallow cultivation with efficient weed and disease control gives better yields.

e] **Manuring** : It is suggested that soil analysis should be done before assessing the correct amount of fertilizer to be used. However from the present practices and fertilizer trials, application of ammonium sulphate,

super-phosphate, potassium sulphate or muriate of potash have been recommended. As it is a leguminous plant it is capable of fixing atmospheric nitrogen through the symbiotic association with bacteria - (Rhizobium Phaseoli). However significant responses to the applications of nitrogen were recorded. Nitrogen deficiency due to ~~tower~~ nodule activity restricts growth and leads to lower protein content in the plant and seeds. Deficiency of phosphorus depresses flowering where as excess amount hastens maturity. Super phosphate was found to be the best form of phosphorus to be applied due to its solubility. Application of potash accelerates nodule and fruit growth. It improves yield and overall quality.

f] **Plant Protection** : The weeds developed between plants within the row needs handwork for control. But in western countries chemical weed control is widely adopted (like herbicides). These herbicides are to be used according to soil type and weather. Dinitro materials are sprayed on the soil at the rate of 3-6 lb/acre. Propachlor applied at 4 lb/acre in medium to high volume has given good control of weeds by residual action but later application leads to crop damage. Even today herbicides for controlling weeds are not commercially used in India.

In order to obtain better yield it is necessary to protect the crop not only from weeds but from diseases and pests. As these plants are susceptible to fungal, bacterial and viral diseases control measures are necessary. There are several diseases like stem blight, powdery muldew, rust, common blight, (bacterial), mosaic (viral) which affect the growth and yield of mung in India. Spraying of insecticides is advisable. Besides these the crop may suffer from different non parasitic diseases due to physiological disorders arising from nutritional deficiency. These disorders are corrected after proper diagnosis of the deficit elements in the plant and soil.

g] **Harvest & Yeild** : Since all flowers do not open uniformly. There are variations in the size and maturity of seeds at the time of harvest. All varieties should be harvested before, they become tough and stringy and seeds become enough to cause the pod bullge arround the seeds. If harvest is delayed, total yield increases but the quality decreases rapidly after the seed development. Picking is usually done by hand. Mechanical pickers have been developed in the advanced countries.

Harvesting should be started before the lower pod become dry enough to shatter. They are threshed either by bullocks or by machine. It is skilled art which requires careful handling, because in threshing there is every posibility of causing internal injury. After the threshing the seeds are cleaned. In the cleaning process the trash and inert materials are removed by fanning and screening.

II. PHYSIOLOGY OF SENESCENCE IN P. AUREUS

In India especially in Maharashtra this crop is grown but it has restricted yield because of susceptible varieties and poor management. However, the release of new varieties of better yield and disease resistance have made the crop more popular among the farmers.

To release the new varieties a detailed study of various varieties including senescence is essential because it also affect the yield. Yellowing is the visible symptom of senescence. It is because of degradation of chlorophyll pigment. It is also due to very slow decrease in carotenoids (Chaudhari etal 1976) Sestak (1985) commented that general trend of sum of carotenoid accumulation during leaf ontogeny is similar

to that of chlorophyll. As there is degredation of chlorophyll which altimetly reduce the photosynthetic rate (Woolhouse 1967, etal). There is also degredation of enzymatic actroity like Ru BP case and PEP case (Peterson and Huffaker 1975 etal). There is reduction in sugar synthesis and stimulation in the synthesis of amino acids and organic acids in the senescent leaves (Roa fat and Hoffner 1971;Nimbalkar and Joshi 1974 ; andWillims and Kennedy 1977).

During senescence there is increased level of peroxidase which involved in the oxidative processes. Enzyme catalase protects the cells from distruction by hydrogen peroxide is decreased rapidly during senescence (Grinberg 1971 and Kar and Mishra 1976). Catabolic reactions are precominent in senescence in which carbohydrate and proteins are brocken down into simple sugars and amino acids. The loss of protein and chlorophylls is due to decreased synthetic activity than degradative process (Goldthwaite and Leatsch 1967) The decrease in protein content in leaves during - senescence associated with the decrease in RNA content and ribosome content. Senescence is caused by failure of the DNA and effective template for RNA synthesis

(Osborne 1962). Philips and Fletcher (1969) reported that simultanious increase in RNA and RNase in maturing tissue and decrease during senescence of bean leaves.

In fact leaf senescence is influenced by the other organs of the plant (Leopold 1961). Products of macromolecular hydrolysis are rapidly exported from infact senescing leaves (Simon 1967). Accumulation of less important and rather toxic nutrients and withdrawl of essential elements from the senescing leaves has been observed by many workers. The decline in nucleic acids, proteins and chlorophyll content in the process of senescence has been reported (Krul 1974 and Spencer and Titue 1973) while the decline in sugars have been reported by Titley and thimann (1974). The studies with halophytes indicated that salt accumulation in the leaves stimulates senescence and then essential elements like K, P, N are withdrawn from these leaves and transported to the rapidly growing regions of the plant.

However senescence can be dealyed by endogenously as well as exogenously applied growth harmones. Harmonal studies indicated that increased auxin

production, diminished gibberllin content, decline in cytokinin and increased production of ethylene and abscisic acid (Ting Yun and Beevers 1970; Evenchen and Ztai 1975 Woolhouse and Batt 1976). In Rumex species and Tropaeolum majus cytokinin plays an improtant role. Cytokinins coming from roots via xylem are known to delay leaf senescence of soyabean plant (larry D, otal 1990). The increased endogenous abscisic acid maintains. Primary not growth and inhibit short growth of maize seedling at low water potential (I mad N. Saab et al. 1990). The salinity and water stress also induces the senescence (Ziska etal. 1990). Salinity induces limitations on photosynthesis in Prunus salicinia. It has been associated with tolerance may be useful for genetic manipulation for saft tolerance (Joshi etal. 1985).

III. SCOPE OF THE PRESENT INVESTIGATION :

The present research work is conducted fundamental research on various growth response of mung plants to the presence of sodium chloride salts. Salinity is known to induce growth retardation in mung plants through its influence on various aspects of metabolism.

Recent experiments indicates that though Phaseolus sps. are salt sensitive, there is difference in salt tolerance potential with different doses. The mung varieties are studied under different concentrations of Nacl in present investigation. However, in India there are very few reports available on the physiology and biochemistry of this crop (Panday and Kannan 1979). However, Hug and Larher (1983) studied salt tolerance in phaseolus auxus Roxb. (mung) and observed that Na^+ accumulation is increased with increasing external Nacl level and Cl^- was principle balancing anion to conteract Na^+ accumulation . Though the mung variety contain less protein it is popular in Maharashtra as yellow and green mung as pulse crop. It gives satisfactory yield in some districts of Maharashtra during Kharip.

Soil salinity is serious problem of Indian agriculture and Maharashtra. So to know the effect of salinity on P . auxus study is made. With this view in order to understand how chlorides differ their action on two varieties of mung is cleared. Various experiments were conducted to study the different growth parameters, organic and morganic status.

As senescence is also another important physiological process limiting photosynthetic study of leaf at mature and senescent stages of the development under salt stress.