CHAPTER - I

INTRODUCTION

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Pigeonpea (*Cajanus cajan* (L) Millsp) is one of the major sources of pulses providing staple diet to a large proportion of people in tropical and sub-tropical countries. This crop is the backbone of nutritional security for most people wherever grown it is mainly used as dal. Nutritionally it is rich in protein, Iron, Iodine and the essential amino acid like lycine, cystine and arginine.

Table-A Nutritive value(per 10g.) of pigeonpea.

S.No.	Food Value		
1.	Moisture	-	1.34%
2.	Protein	-	2.23g
3.	Fat	-	0.17g
4.	Minerals	-	0.35g
5.	Fibre	-	0.15g
6.	Carbohydrates	-	5.76g
7.	Calcium	-	7.3mg
8.	Phosphorus	-	30.4mg
9.	Iron	-	0.58mg
10.	Vitamin B. Complex	-	Small amounts

(Singh, 1998).

Pigeonpea being a leguminous plant is capable of fixing atmosphere nitrogen and there by restore and maintain nitrogen balance in the soil. Its deep root system helps in extracting the nutrients and moisture from deeper soil layers. Deeper root system also help in breaking the plough pans and help in improving soil structure. Extensive ground cover of pigeonpea prevents soil from wind and water erosion, encourages infiltration, minimises

sedimentation and smothers weeds.

In totality, the crop being a source of protein to most people in North Eastern India, received enough attention. In place of annual varieties, varieties maturing with 6 monthes were developed and tried. The fact remains that still varieties maturing in a year are being cultivated. The survey of literature reveals that the production and productivity of the crop, despite scientific developments, never increased significantly. It is now clear that this crop suffers immensely due to attack of various pests. Take the examples of diseases that attack this crop and limit its production.

Pigeonpea suffers from above 60 diseases caused by biotic and mesobiotic agents (Reddy, *et al.*, 1993). Major diseases and their causal agents are summarized in table B.

Table B:

S.No.	Diseases	Causal Organism
1.	Collar Rot	*Sclerotium rolfsii* Saccardo
2.	*Phytophthora* Blight	*Phytophthora drechsleri* Tucker *f. sp. cajani* (Erwin and Nene)
3.	*Fusarium* wilt	*Fusarium udum* Butler
4.	*Macrophomina* Stem Canker	*Rhizoctonia bataticola* (Taub.), Butler *Macrophomina phaseolina* (Tassi), Goidanich
5.	*Phoma* Stem canker	*Phoma cajani*,Khune and Kapoor
6.	Anthracnose	*Colletotrichum cajani*, Rangel *Colletotrichum graminicola* (Ces), Wilson
7.	Powdery mildew	*Oidiopsis taurica*, (Liv) Salmon
8.	*Alternaria* blight	*Alternaria tenuissima*, Kunze *Alternaria alternata*, (Fries.) Keissler
9.	Rust	*Uredo cajani*, Sydow
10.	Halo blight	*Pseudomonas syringae* pv. *Phaseolicola*, young *et al.*
11.	Sterility Mosaic	*Tenui* virus
12.	Yellow Mosaic	Vector- *Bemisia tabaci*
13.	Phyllody	Mycoplasma-like organism (Vector. Not Known)
14.	Pearly Root	*Heterodera cajani*, Koshy

Among the diseases listed, wilt of pigeonpea caused by *F. udum,* is possibly the most serious and wide spread. *Fusarium* wilt of pigeonpea a soil-borne disease was first reported in 1906 from Bihar(Butler, 1906). The disease appears in young seedlings in August, however, the highest mortality occurs at flowering and podding stage in November on words. It is a disease that appears in patches but repeated cultivation of the crop help in development of inoculum potential and these disease may extend to entire field. The fungus can be isolated from apparently helthy 15 days old plants from a wilt sick-plot (Nene *et al.*, 1980). The yield loss depend on the stage at which the plants wilt. It can approach 100% When it appears at the prepod stage, about 67% loss occurs at maturity and 30% loss occurs at the preharvest stage (Kannaiyan and Nene, 1981).

In India the annual pigeonpea crop loss, due to wilt alone, has been estimated to US $ 36 million, While in Estern Africa annual losses were stimated at $ 5 million (Kannaiyan *et al.*, 1984).

The causal organism of wilt disease of pigeonpea is *Fusarium udum* (Butler, 1910) and its perfect stage is described as *Gibberella indica* (Rai and Upadhyay, 1982). *Fusarium udum* is pathogenic to pigeonpea only (Upadhyay and Rai, 1989), and is soil-borne facultative parasite which enters through roots and later on becomes systemic. It can be isolated from all parts of the host from lateral fine roots to pidicel and pod hull (Nene *et al.*, 1979). The pathogen usually occurs more frequently and high population in the vicinity of the infested and wilted plant roots.

The fungus extends more rapidly from one place to another along the root than accross the soil (Butler, 1910). It is dispersed through irrigation, rain water and displacement of host

debris from one place to another. The propagules of the pathogen are also dispersed by termites that feed frequently on the dead wilted plants (Upadhyay and Rai, 1982). The pathogen has been found to be seed-borne in tolerant pigeonpea cultivars (Haware and Kannaiyan, 1992). It survives in the soil for 3 years in the abseance of pigeonpea (Kannaiyan, *et al.*, 1981). The pathogen show a great deal of variation in cultural characteristics (Reddy and Chaudhary, 1985).

The analysis of the total pathology of the disease particularly its management reveal the fact that so far no well defined management stretegy has been developed. It is also clear theat all the approches made so for to manage the disease had unilateral approch. It has not been seriously tried to integrate various management strategies to develop suitable I.D.M. module. In to day's era of commercial agriculture, we need to develop techniques that are sustainable ecofriendly and harmoneous to ecosystem. Keeping there facts in mind, investigation were under taken to explore the utility of indigenous microflora particularly those are antagonists along with botanical oils and fungicides to develop a capsule that can provide integrated and sustainable control of the disease. Different aspect studied include :

1. Isolation of the pathogen (*Fusarium udum*) and Koch's postulates (Pathogenicity).
2. Enumeration and isolation of soil microflora from crop ecosystem. Rhizosphere fungi, bacteria, actinomycetes, etc.
3. Selection of antagonists and its potential to control the pathogen.
4. Screening of biocontrol agents against some pesticides and

organic amendment (oil cakes) to search effective combination.

5. Effect of selected antagonists, oil-cakes and pesticides on the incidence of wilt in pots, changes in rhizosphere microflora to be studied.
6. The formulation of effective biocontrol agents with effective concentrations of Oil-cakes, pesticides and study on their effects in potted soil on percent incidence of wilting and population dynamics of the pathogen.
7. Study on effects of the effective integrations on incidence of the wilt disease in experimental sick field.