
CHAPTER I
INTRODUCTION

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The pulses constitute the major source of protein in vegetarian diets and therefore occupy an important position in Indian agriculture. The country has about 35 per cent of the total pulses area in the world and accounts for about 27 per cent of the world's pulses production. Although a variety of grain legumes are grown in different parts of the country, the pace of their production has so far remained low and far behind the rate of increase in demand. In fact, over the last three decades, the per capita availability of pulses has declined from 75 g/day to 40 g/day (Lal, 1987). In order to achieve the present target of providing at least 60 g of pulses/head/day, the country's current production needs to be nearly doubled by the turn of the century (Sharma, 1981).

Pigeonpea is the second major pulse crop of India and accounts for 90 per cent of its production in the world. Having a wide adaptability to soil and climate, it is cultivated all over the country, with the exception of excessively wet or frost prone areas. Further, by virtue of its deep rooting and drought tolerant nature, it is particularly predominant in the semi-arid drought prone areas. It is produced both under mixed and monocropping systems. In general, the traditional varieties being photosensitive and

of long duration, the cultivation of pigeonpea as mixed or intercrop is more common than as monocrop. However, with the introduction of short duration and photoneutral varieties, the possibility of growing pigeonpea as a sole crop particularly in a multiple cropping system has considerably improved.

In the eastern region of the country about 86 per cent of the cultivated area is monocropped with rice, which is now being considered for cultivation of oil seeds and pulses after the harvest of rice. Irrigation requirement of these crops is known to be comparatively less than that of other conventional crops, as most of these are not only capable of exploiting the soil moisture most efficiently but also possess remarkable ability to sustain water deficit conditions. Growing pigeonpea during winter following the wet season rice can be rewarding. However, for exploiting its potential in such a non-traditional cropping system, development of an appropriate package of practice (time of sowing, plant population, fertilizer and water management etc.) is very much essential.

Time of sowing is considered important for growth and development of any crop because it brings in considerable change in plant environment with respect to photoperiod, temperature and availability of soil moisture. Successful matching of crop and environment is, therefore, basic for

proper expression of its yield potential. Considering the fact that in rice growing areas, the harvesting of wet season rice is spread over October to December, determining suitable time of sowing of pigeonpea, after harvest of wet season rice, becomes imperative.

When a crop is introduced in a new area and a desired level of yield is to be achieved for varieties of different durations, plant population is essentially to be matched with sowing time. The improved, short duration pigeonpea varieties are basically compact in nature. Therefore, higher plant population is required for better performance of these varieties; more so when these are grown in winter because of the restricted crop growth. However, to avoid competition among the closely growing plants, it is essential to adopt an optimum plant population density.

In traditional agriculture, pulses have been grown mostly on marginal and submarginal lands characterised by poor fertility. However, the necessity of an adequate supply of phosphorus for realizing high yields of pigeonpea has been widely emphasized. But in general, phosphorus being immobile in soil, only about 20-25 per cent of the applied phosphorus is utilized by a crop and the rest is retained in the soil (Mandal and Khan, 1977), which may

benefit the succeeding crop. Therefore, while applying phosphorus to a crop in sequence, it is necessary to consider the quantity of nutrient supplied to the preceding one. Especially when a leguminous crop like pigeonpea forms a component of the rice-based cropping sequence, precise application of phosphorus to the system as a whole becomes important, considering the residual effect of this nutrient and high demand of pigeonpea for phosphorus.

Pigeonpea is generally grown as a rainfed crop. Being deep rooted, it has greater capacity to exploit moisture from deeper soil layers. However, irrigation for winter crop may be essential since the crop is grown under relatively dry climate, and moisture retained in the soil at harvest of rice may not be sufficient to meet the crop requirement. The time of sowing is also considered to have an important bearing on irrigation requirement because of the differential evaporative demand during the growing period of early and late sown crops. Therefore, determination of appropriate irrigation schedule becomes necessary for the crop sown on different dates.

Selection of suitable intercropping system is known to increase the productivity over space and time. The advantage of this system can be enhanced only when the component crops complement each other in utilizing the available resources.

The deep root system, adjustability to wide row spacing and slow growth in the early stages of pigeonpea make it suitable for inclusion in many intercropping systems. Sowing of crop in the normally recommended uniform row distances would afford little or no opportunity for accommodating companion crops. However, by resorting to a technique like paired row planting, more space can be provided for development of the subsidiary crop without affecting the base crop population. Therefore, determination of appropriate planting geometry and spatial distribution of pigeonpea and its intercrop are considered important for mutual benefits and higher productivity from pigeonpea.

Keeping the above points in view, experiments have been conducted with the following objectives :

- i) To determine the suitable sowing time and optimum plant population for pigeonpea varieties of varied duration, when these are grown during winter in sequence to wet season rice.
- ii) To find out the optimum level of phosphorus fertilization for winter pigeonpea, with due consideration to the nutrient applied to the preceding rice crop.
- iii) To know the suitable irrigation schedule for winter pigeonpea under both early and late sown conditions.

- iv) To identify the crops suitable for intercropping with winter pigeonpea, and to determine the appropriate spatial arrangement of the component crops for attaining higher productivity of the system.