INTRODUCTION
CHAPTER-I

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With the present production level of around thirteen million tonnes from 20 million hectares, oil seed crops constitute the second largest agricultural produce in India after food grain. About 14 million persons are engaged in the production of oil seeds and another 0.5 million people in their processing. Thus, in terms of value of output as well as potential, oil seeds production is far more important than many large industries put together. But the fact remains that per capita consumption of oil in India is hardly about 0.5 kg per annum, whereas the minimum requirement of oil as per nutritional experts is 10 kg per capita per annum (Basu and Reddy 1989).

In the oil seed scenario of India, groundnut is the largest component which occupies 45 per cent of the total oil seed area and contributes 55 per cent of the total production. Although India ranks first in the world in terms of both groundnut area (7.7 m.ha) and production (6.6 m tonnes), its productivity is low and ranks 10th in world's groundnut productivity. The production of crop is dependant upon the availability of solar radiation, water and nutrients. These resources can not be controlled during kharif under Indian conditions particularly in sub-humid climate. Excess or
inadequate water availability during the critical growth stages is one of the important cause for low productivity. On the otherhand in rabi/summer groundnut cultivation the irrigation water component can be managed more efficiently. Among the agronomic factors known to augment crop production, water management stands next to fertilizers, contributing 27% in groundnut production (Dayal et al. 1989).

Due to favourable conditions during summer season & availability of irrigation water groundnut crop is becoming popular in parts of Tamil Nadu, Andhra Pradesh, Karnataka, Orissa and Eastern part of Madhya Pradesh (Chhattisgarh region), the crop is raised under irrigation in summer. The summer crop gives more than thrice yield of the kharif crop due to favourable climatic conditions for the growth and development of the crop and low incidence of pests and diseases. Higher temperature coupled with adequate light intensity leads to more enzyme production in the leaf which facilitates greater photosynthetic activity.

Area under rabi/summer groundnut is expanding very fast. Since the irrigated groundnut is not subjected to vagaries of monsoon and is less exposed to pest and disease complex, possibility of increasing its productivity and stabilizing production are immense. Further expansion in area under rabi/summer groundnut depends upon the availability and
management of irrigation water. Therefore, use of irrigation resources should be scientific in approach to get higher water use efficiency. The rabi/summer crop (November-May), needs about 450-830 mm water depending upon soil type and agroclimatic conditions. In all, 9-12 irrigations are required to raise a good crop (Basu and Reddy, 1989).

Groundnut is a leguminous plant which fixes atmospheric N in the root nodules and thereby the demand for applied nitrogen reduces. The contribution of biologically fixed N to the total nitrogen requirement of the plant has not been completely quantified but there are indications that under optimum conditions groundnut plant can fix atmospheric N to an extent of 200-260 kg N/ha (Williams, 1979; Dart and Krantz, 1977), eliminating or reducing the need for application of fertilizer N. But, the amount of nitrogen fixed symbiotically depends on three major factors, viz. the rhizobial strain, the genotype of the host plant and elements of the external environment which include soil moisture and temperature, light intensity, day-length and availability of N, P, K, Mn, Mg, Ca, S, Mo, Zn and B (Bharadwaj and Pathak 1968; Nair et al. 1970).

Groundnut fulfills its N requirement by fixing atmospheric nitrogen but phosphorus nutrition is most important. Nutrient survey of standing crop in Saurastra region of Gujrat, and parts of Andhra Pradesh have revealed wide
spread P deficiency in groundnut (Singh and Venkateswarlu 1985, Subba Rao, 1975). The soils of Chhattisgarh plain region are also deficient in P. A crop yielding 2.0 - 2.5 t/ha absorbs 25-30 kg P₂O₅/ha. A 30-60 per cent increase in yield can result from P applications, the optimum level of which may range from 20 to 60 kg P₂O₅/ha depending on the initial P level (Pasricha et al. 1987). Higher levels of P utilize the less soluble forms of soil P more as compared to cereals (Pasricha et al. un-published results). The large variation in the optimum amount of P needed for groundnut is due to differences in soil properties, moisture regimes, rotational effects and sources of P. In a majority of studies, researchers have used SSP as the P fertilizer without always taking its 12% S into account and therefore part of the yield increase due to SSP application.

Chhattisgarh is predominantly a rice growing belt under monocropping system. However, there are areas succeeding rice crop where irrigation is available for rabi-summer crop. Farmers are still tempted to utilize rice fallows for summer paddy again in absence of alternative crops. Growing rice-rice rotational system over years has resulted into the buildup of pest cycle affecting the kharif rice. Summer rice also needs substantial amount of water besides pest problems. Amongst the crops to be grown in summer, preliminary studies have shown the high remunerative capacity of groundnut. However, specific
agreronomic recommendations are not available being a new introduction. It holds good promise as an alternative oil seed crop, for effective utilization of left out water economically. The congenial climate and suitable soil types of this region can be explored for the popularization of groundnut crop, for meeting for oil crisis over rice-rice rotational system. The total water need can be reduced to almost half after replacement of rice.

Out of agronomical parameters for increasing the production and productivity of groundnut, working out irrigation schedule, quantity of water and its frequency on a scientific line would be the first step. Being a leguminous crop, it would be equally important to work out the requirement of phosphate. No such information is at present available on the medium textured soil of Chhattisgarh region to base specific recommendations.

The present investigation is therefore aimed to fulfil the following objectives:

1. To work out irrigation schedule its number and frequency based on IW/CPE ratio.
2. To determine economic level of phosphate fertilization.
3. To study the interaction effect of irrigation with levels of phosphate fertilization.
4. To determine water use efficiency of groundnut crop.