

## The productivity and residual soil fertility status under different of rice based cropping systems in scarce rain fall zone of Andhra Pradesh, India

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### ABSTRACT

A field experiment was conducted on sandy loam soils of Reddipalli, Anantapur district during 2000-2002 to evaluate the productivity and residual soil fertility status in different cropping systems in undisturbed layout in the farm. The rice equivalent yield was highest with greengram-rice-rice during first year and greengram-rice-groundnut during second year of study. Soil organic carbon, soil available phosphorus, soil available potassium were found increased by the end of two years of experimentation compared to initial status. The highest soil available nitrogen balance was recorded with greengram-rice-groundnut after first year and fallow-rice-groundnut after second year. Negative soil available nitrogen balance was registered with sesame-rice-sunflower system, during both the years of study. Phosphorus buildup in soil was observed with sunhemp-rice-rice and the lowest balanced was recorded with sesame-rice-sunflower system, during first year and with fallow-rice-fallow system during second year of study. The negative balance of soil available phosphorus was registered with fallow-rice-sunflower, sesame-rice-sunflower, sesame-rice-groundnut and fallow-rice-groundnut systems at the end of first year while phosphorus balance was positive with all the cropping systems tried at the end of second year. The highest positive balance of soil available potassium, was noticed with sunhemp-rice-rice during both the years of investigation.

**Key words :** Residual soil fertility, Cropping system, Soil nutrient, Nutrient balance.

### INTRODUCITON

Nutrient depletion studies restricted to individual crops. The high yielding varieties grown in multiple crops sequences with recommended package of practices remove considerable amount of nutrients from soil and thus information is needed to understand the mining of soil nutrients and to work out the nutrient balance over a period of time. An effort was made to workout balance sheet of N, P and K of different cropping systems.

### MATERIALS AND METHODS

Field experiments were conducted during 2000-02 at Agricultural Research Station, Reddipalli, Anantapur district; Andhra Pradesh to develop a sustainable cropping system for Tunga Bhadra Project high level canal irrigated areas of Scarce Rainfall zone of Andhra Pradesh. The experiment was laid out in randomized block design, replicated thrice with twelve cropping system. The cropping systems tried were Fallow - Rice - Fallow, Sunhemp - Rice - Fallow, Sunhemp - Rice - Rice, Fallow - Rice - Rice, Fallow - Rice - Groundnut, Fallow - Rice - Sunflower, Sesame - Rice - Rice, Sesame - Rice - Groundnut, Sesame - Rice - Sunflower, Greengram - Rice - Rice, Greengram - Rice - Groundnut, Greengram - Rice - Sunflower. Sunhemp, greengram, sesame crops during *prekharif*, rice during *kharif* and groundnut rice

and sunflower during *rabi* were tested. All the crops were given recommended dose of fertilizers. Soil samples were drawn from 0-30 cm depth in each treatment prior to experimentation and after harvest of each crop in the cropping systems. Nutrient balance in the cropping systems for available N,  $P_2O_5$  and  $K_2O$  in soil was computed for different cropping systems as per the procedure suggested by Sadanandan and Mahapatra (1973 a), Sadanandan and Mahapatra (1973b) Yadav(1981) and Sandanandan Mahapatra (1974).

### RESULTS AND DISCUSSION

#### *Cropping systems productivity*

The rice equivalent yield in cropping system having 300% cropping intensity was more than two crops in a year. The rice equivalent yield was the highest with Greengram - Rice - Rice system which was comparable both Sesame - Rice - Rice and Greengram - Rice - Groundnut systems during first year and Greengram - Rice - Groundnut during second year of study. The lowest rice equivalent yield was recorded with single cropped rice during both the years of study (Table. 1). The improvement in Greengram - Rice - Rice or Greengram - Rice - Groundnut or Sesame - Rice - Rice system can be attributed to substantial increase in the economic yield of all the three component crops in cropping system. The

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