

## Input Management in Maize

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**Abstract :** Field experiments were conducted from 1997-2001 at Tamil Nadu Agricultural University, Coimbatore on sandy loam soil to study the effect of graded doses of NPK (100, 125 and 150 per cent of the recommended dose) under two population levels on the productivity of maize (*Zea mays* L) under irrigated condition. The highest productivity was obtained with 150 per cent of recommended NPK with FYM @ 12.5 t ha<sup>-1</sup> in all the years and the effect of plant population was not significant. The interaction effect was found to be significant. The highest BC ratio of 1.66 was recorded in the treatment which received 125 per cent of recommended dose of fertilizer under recommended population.

**Key words :** Maize, Fertilizers, FYM, Population.

### Introduction

The population of India is increasing at an alarming rate. If the present trend of population growth does not decline, National Academy of Agricultural Science (NAAS) estimated that India may need 301 million tones of food grain by 2025 AD (Kanwar and Katyal, 1997). The net cropped area is almost stagnant for the past ten years and no further area can be brought under plough. The only solution for meeting the ever-increasing demand for agricultural produce is increasing the unit area productivity. The soil is not an inexhaustible storehouse of nutrients. With intensive agricultural practices, without commensurate restorative inputs, the future threat to soil fertility will be very serious. For maintaining productivity and building up of soil fertility, the use of organic manures is very essential. For maximizing productivity it is therefore important to define package of practices that include best of all controllable variables under particular type of soil and climate (Dev, 1990). Among the agro techniques, plant population and fertilizer application contribute more towards maximizing the yield. Fertilizer responsive crops like maize remove maximum quantity of nutrients from soil. The investigation was carried out with an objective to

study the effect of different fertilizer levels with and without FYM on the yield of maize under two population levels.

### Materials and Methods

Field experiments were conducted under irrigated condition with maize at Tamil Nadu Agricultural University, Coimbatore in the same plots for four years from 1997-98 to 2000-2001 under the All India Coordinated Research Project on Cropping Systems Research. The soil of the experimental field was sandy loam (*Vertic ustropept*), slightly alkaline in reaction (pH 8.2), well drained with moderate permeability. The soil was low in available nitrogen (149 kg ha<sup>-1</sup>), medium in available phosphorus (18.4 kg ha<sup>-1</sup>) and high with respect to available potassium (348 kg ha<sup>-1</sup>). The field experiments were laid out in split plot design with six main plot treatments and two sub plot treatments replicated four times. The main plot, treatments comprised of different levels of fertilizers with and without organics viz., recommended dose (100%) NPK (F1); recommended dose of NPK + FYM @ 12.5 t ha<sup>-1</sup> (F2); 125 percent recommended dose of NPK (F3); 125 percent of recommended dose of NPK + FYM @ 12.5 t ha<sup>-1</sup> (F4); 150 percent of

Table 1. Yield of Maize as Influenced by Different Levels of Fertilizers With and Without FYM and Population Levels

Year	1997	1998	1999	2000	Pooled mean
Mean					
S					
S					
Mean					

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Year	1997			1998			1999			2000			Pooled mean			
	S <sub>1</sub>	S <sub>2</sub>	Mean	S <sub>1</sub>	S <sub>2</sub>	Mean	S <sub>1</sub>	S <sub>2</sub>	Mean	S <sub>1</sub>	S <sub>2</sub>	Mean	S <sub>1</sub>	S <sub>2</sub>	Mean	
Fertilizer levels (F)																
F1	4272	4358	4315	4136	4144	4125	3714	3532	3623	3906	3748	3827	4040	3906	397	
F2	5124	4742	4933	4686	4624	4655	4196	4140	4168	4126	4392	4259	4508	4500	450	
F3	4736	4842	4789	4488	4688	4588	4094	4080	4087	4178	4102	4140	4490	4312	440	
F4	5286	5070	5178	4904	4892	4898	4484	4308	4396	4396	4300	4348	4736	4674	470	
F5	5120	5176	5148	4896	5006	4951	4306	4588	4447	4446	4224	4335	4604	4836	472	
F6	5314	5152	5283	5110	4896	5003	4398	4600	4499	4360	4296	4328	4791	4765	477	
Mean	4975	4907	4941	4703	4703	4704	4199	4206	4203	4235	4177	4206	4528	4499	451	

Year	1997			1998			1999			2000			Pooled Mean		
	SEd	CD	SEd	SEd	CD	SEd	SEd	CD	SEd	CD	SEd	SEd	CD	SEd	CD
Fertilizer level (F)	99	211	73	156	98	209	45	97	32	69					
Population (S)	34	NS	11	NS	7	NS	27	NS	50	NS					
F X S	165	346	87	183	144	302	59	124	32	68					
S X F	144	303	72	151	136	286	55	115	28	58					
F1 : 100 % NPK (135 : 62.5 : 50kg ha <sup>-1</sup> )	F2 : 100 % NPK (135 : 62.5 : 50kg ha <sup>-1</sup> ) 1 + FYM @ 12.5 t ha <sup>-1</sup>														
F3 : 125 % NPK (169 : 78 : 62.5 kg ha <sup>-1</sup> )	F4 : 125 % NPK (169 : 78 : 62.5 kg ha <sup>-1</sup> ) + FYM @ 12.5 t ha <sup>-1</sup>														
F5 : 150 % NPK (203 : 94 : 75 kg ha <sup>-1</sup> )	F6 : 150 % NPK (203 : 94 : 75 kg ha <sup>-1</sup> ) + FYM @ 12.5 t ha <sup>-1</sup>														
S1 : Normal population (:83,333 plants ha <sup>-1</sup> )	S2 : 30 percent more than the normal population (1,08,333 plants ha <sup>-1</sup> ).														

**Table 2.** Economics of Different Levels of Fertilizers With and Without Organics and Population Levels

Treatments	Cost of cultivation Rs.	Gross Returns Rs.6	Net Returns (Rs.)	BC ratio
F1S1	16005	24390	8385	1 : 1.52
F1S2	16065	23280	7215	1 : 1.45
F2S1	18505	26862	8357	1 : 1.45
F2S2	18565	27186	8621	1 : 1.46
F3S1	16740	26574	9834	1 : 1.59
F3S2	16800	26238	9438	1 : 1.56
F4S1	19240	28446	9206	1 : 1.49
F4S2	19300	28014	8714	1 : 1.45
F5S1	17475	29004	11529	1 : 1.66
F5S2	17535	27636	10101	1 : 1.58
F6S1	19975	27738	7763	1 : 1.39
F6S2	20035	29604	9569	1 : 1.48

FYM @ Rs.200 / ton ; N @ Rs.10.50 /kg ; P@ 18.80 / kg ; K @ 7.20/kg and maize gain (a) Rs.6.00 /kg

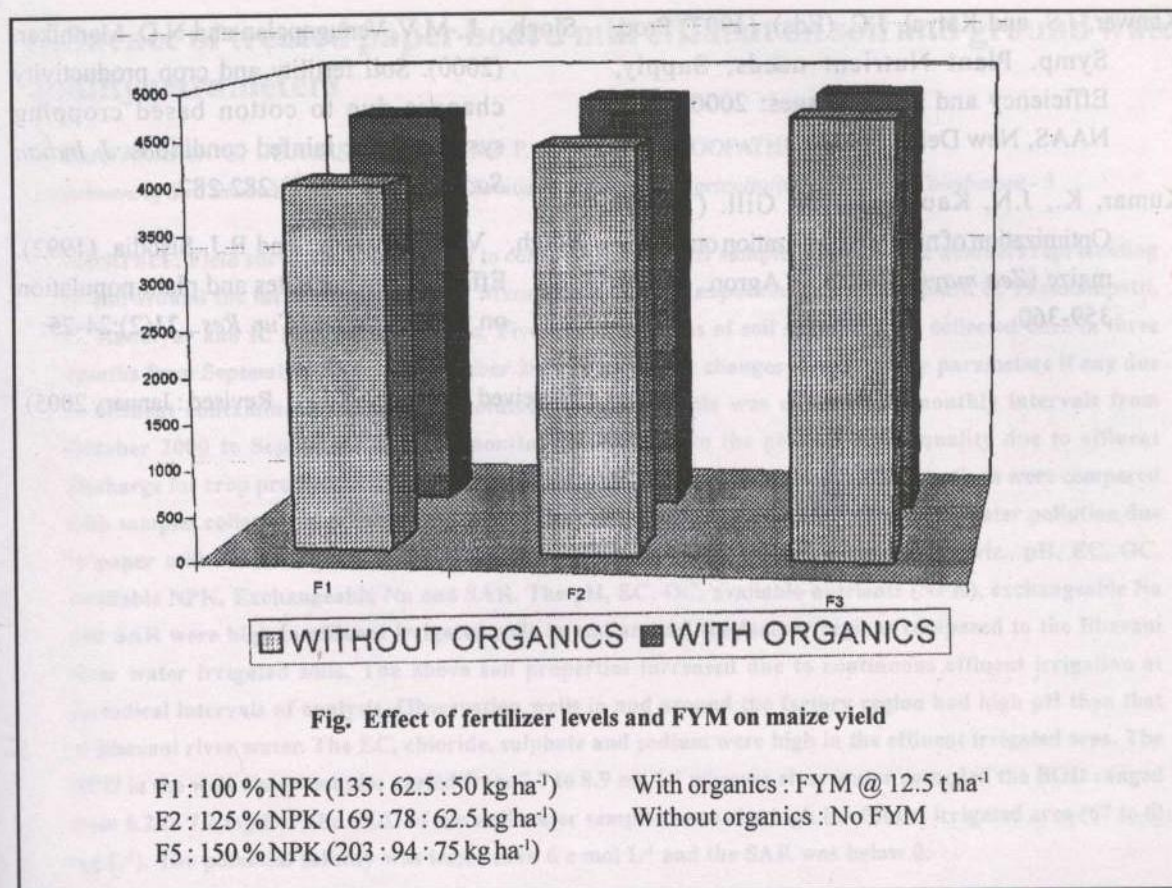
recommended dose of NPK (F5); 150 percent of recommended dose of NPK + FYM @ 12.5 t ha<sup>-1</sup> (F6). The sub plot comprised two population levels, normal population (S1:83,333 plants ha<sup>-1</sup>) and 30 percent more than the normal population (S2: 1,08,333 plants ha<sup>-1</sup>). Maize (CO 1) was sown during *kharif* (June-July). The crops were raised following the recommended package of practices. Data on maize grain yield was recorded and were subjected to statistical analysis. The economic analysis of the treatments was done in terms of net monetary returns and benefit-cost ratio on the basis of mean values of inputs and outputs.

### Results and Discussion

The grain yield of maize differed significantly due to different treatments tried (Table 1). The three levels of fertilizer application produced a marked variation in the grain yield of maize in all the four years. Application of 150 percent of recommended NPK recorded significantly higher grain yield than 125 and 100 percent NPK, irrespective of the

population levels. The increment in NPK levels from 100 to 150 percent increased the maize grain yield by 12.8, 11.3, 14.8, 7.2 and 12.0 % respectively during 1997, 1998, 1999, and 2000 and in the pooled mean. Application of higher dose of fertilizers increased the grain yield, which might be ascribed to the adequate availability of nutrients. Further, this facilitated greater partitioning of photosynthates to the ear. This is in line with the findings of Kumar *et al.* (1992).

During all the years of study, fertilizers at the same level produced a pronounced effect on yield when applied along with FYM (Table 1 and Fig). The mean yield showed that the increment in yield was more at lower levels of fertilizers than at higher levels. An increased yield of 12.32% at 100 per cent NPK, 7.50% at 125 per cent NPK and 1.63% at 150 per cent NPK was observed when applied with FYM. Addition of bulky organic manure would have improved the physical properties of soil and created an ideal rhizospheric



environment. This positive effect might have provided congenial soil-water relations for better nutrient release and availability. Besides, supplying major nutrients organic manures also supply the plants with the required amount of micronutrients (Singh *et al.*, 2000).

The effect of plant population on maize yield was not significant. Singh *et al.* (1992) concluded that plant population did not seem to have any significant effect on maize yield.

On perusal of the data on economics (Table 2) the highest net income and cost benefit ratio was obtained when organic manure (FYM) was skipped. However, if FYM produced in the farm itself is used, application of FYM would have a favourable effect on the yield and BC ratio. The enhancement in

fertilizer application to the tune of 25-50 per cent above the recommended level increased the gross, net return and BC ratio. Altering the geometry of the plant by increasing the population by 30 per cent above the normal recommended level reduced the gross and net returns.

Application of 150 per cent recommended dose of fertilizer with recommended maize population (83333 plants ha<sup>-1</sup>) is suggested for obtaining maximum productivity and RC: ratio under irrigated condition.

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(Received : February 2004    Revised : January 2005)

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