Table 6. Physical and Chemical characteristics of AS 688

S.No	Details of characteristics	AS 688	ASD 8	TK
1.	Milling	72.6	75.6	6
	a) Endosperm (%)	26.8	24.2	3
	b) Husk (%)	0.40	0.14	0
	c) Premature grain (%)			
2.	Polishing			
	a) White rice (%)	82.67	80.67	79
	b) Bran (%)	14.93	18.02	19
	c) Broken rice (%)	2.40	1.30	1.
3.	Chemical characteristics			
	1. Moisture (%)	13.64	13.7	13.
	2. Ash content (%)	0.56	0.60	0.
	3. Protein (gm)	6.08	6.27	6.
	4. Amylose (%)	31.50	30.50	21.

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REFERENCES

AICRIP, 1981. All India Co-ordinated Improvement Project report for 1981.

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EFFECT OF FERTILIZER MANAGEMENT ON NUTRIENT UPTAKE BY SORGHUM AND GROUNDNUT UNDER DOUBL CROPPING SYSTEMS *

A.S.JADAV[1]

ABSTRACT

The experiment conducted during **kharif** and **rabi** seasons at the Agricultural College Farm, Pune revealed that P and K uptake by sorghum was significantly more than by groundnut during all the three years and in pooled data. The pooled N, P and K uptake by sorghum and groundnut was significantly increased when these **kharif** crops were grown after mid-late and late sown wheat as compared to **kharif** crops after normal sown wheat. N,P and K uptake was significantly enhanced when **kharif** crops were grown after the application of 2/3 of the recommended and full levels of fertilizers as compared to 1/3 of the recommended level of fertilizer to wheat.

KEY WORDS : Nutrient uptake, Sorghum, Groundnut.

The results of the experiments carried out showed very conclusively that it was possible to have any number of crops on the same piece of land in one year under

* Part of the Ph.D.Thesis submitted by the author to M.P.A.U., Rahuri (Maharashtra).

1. Agronomist (Pearl Millet), Colle e of Iculture, Pune.

ired irrigation provided sufficient ving season was available and quate quantity of fertilizers were applied neet nutrient requirements of all the ps (Bains, 1968; Mann and Kanwar, 8; Nair and Ambika Singh, 1971 and ardwaj, 1973). However, multiple pping systems exhaust large quantities nutrients from the soil (Randhawa and elu, 1974). Therefore, it becomes cessary to develop systems with efficient tilizer management. However, very little orts have been made to evaluate the N, and K removal from soil by the crops in quence. Attempts have been made in this per to study the uptake of N, P and K by rghum and groundnut under double pping systems with reference to fertilizer nagement.

ATERIALS AND METHODS

Investigations were carried out during *harif* and *rabi* seasons of 1979-80, 1980-81 nd 1981-82 at the Agricultural College arm, Pune. The experiment was conducted a strip plot design with four replications. orghum and groundnut were grown under ainfed conditions during *kharif* and wheat nder irrigated conditions during *rabi*. here were four strips of *kharif* cropping iz., sorghum with half recommended dose (37.5 kg N + 25 kg P_2O_5/ha), sorghum with ull recommended dose (75 kg N + 50 kg P_2O_5/ha), groundnut with half recommended dose (12.5 kg N + 25 kg P_2O_5/ha), and groundnut with full recommended dose (25 kg N + 50 kg P_2O_5/ha). During *rabi*, combination of three sowing dates *viz.*, Normal (9th Nov.), Mid-late (3rd Dec.) and Late (27th Dec.) and three fertilizer levels namely 1/3 of the recommended level (40 kg N + 20 kg P_2O_5/ha), 2/3 of the recommended level (80 kg N + 40 kg P_2O_5/ha) and the recommended level (120 kg N + 60 kg P_2O_5/ha) of fertilizer applied to wheat forming nine strips were aid out across the *kharif* cropping strips. site without changing the randomization of treatments to assess the residual effect. The gross and net plot sizes were 6.50 x 3.50 M^2 and 5.60 x 2.70 M^2 respectively.

The soil of the experimental site was clay loam in texture having soil depth upto 90 cm and slightly alkaline in reaction (pH 8.2). Initial soil test values of 0-30 cm depth profile showed that soil was medium in total nitrogen (1364 kg/ha) and available P_2O_5 (35.23 kg/ha) and fairly rich in available K_2O (484 kg/ha) content. Representative plant, grain and kernel samples were analysed for N, P and K content (Parkinson and Allen, 1975). the uptake of N, P and K was determined by multiplying the per cent N, P and K in sorghum grain and fodder and groundnut kernels, hulls and haulms with their corresponding yields. The total uptake was calculated by summing up the uptake by sorghum grain and fodder and groundnut kernels, hulls and haulms.

RESULTS AND DISCUSSION

Data regarding uptake of N, P and K as affected by various treatments are presented in Table 1. During the period of *kharif* cropping (June to October), the total rainfall received was 734.0 mm in 43 rainy days, 658.9 mm in 49 rainy days and 736.0 mm in 62 rainy days during 1979-80, 1980-81 and 1981-82 respectively. The rainfall received was timely and moisture stress was not experienced during critical crop growth stages of sorghum and groundnut during all the three years resulting in satisfactory yields.

Effect of kharif cropping : The uptake of N and P by sorghum grain and fodder and groundnut pods and haulms was significantly increased when sorghum was fertilized with full fertilizer dose and significantly decreased when groundnut was fertilized with half fertilizer dose during all the three years except N uptake by sorghum fodder and groundnut haulms

Table 1. Mean uptake kg per hectare of nitrogen, phosphorus and potash by sorghum and groundnut at harvest as influenced by different treatments

Treatments	1979-80									1980 - 81								
	Sorghum fodder and groundnut pods (kernels + shells)			Sorghum grain and groundnut haulms			Total			Sorghum grain and groundnut pods (kernels + shells)			Sorghum fodder and groundnut haulms			Total		
	N	P	K	N	P	K	N	P	K	N	P	K	N	P	K	N	P	K
Kharif cropping																		
Sorghum (half dose)	66.36	14.22	17.56	50.51	14.46	57.51	116.93	28.69	75.07	55.37	11.45	14.08	40.33	10.44	45.45	95.70	21.97	59.55
Sorghum (full dose)	82.50	18.75	22.11	63.89	19.64	67.55	146.39	38.44	89.66	69.71	15.66	18.35	49.47	13.36	56.88	119.72	28.94	75.22
Groundnut (half dose)	55.20	12.44	10.37	46.76	8.91	24.34	101.68	21.35	34.71	41.02	8.97	7.80	28.00	5.05	14.97	69.02	14.03	22.63
Groundnut (full dose)	63.78	15.00	12.17	53.13	11.28	28.04	116.90	26.34	40.24	51.59	11.84	9.95	33.39	6.90	17.83	84.98	18.42	27.73
S.E. ±	1.25	0.32	0.37	1.28	0.41	1.01	2.58	0.69	1.31	1.78	0.39	0.47	1.25	0.40	1.38	2.83	0.69	1.80
C.D. at 5%	4.00	1.03	1.19	4.08	1.31	3.24	7.27	2.20	4.21	5.70	1.26	1.51	3.99	1.27	4.41	9.06	2.21	5.76
Sowing dates of wheat																		
Normal	66.40	14.98	15.40	52.32	13.19	43.71	118.52	28.16	59.11	51.35	11.22	11.73	36.43	8.34	32.51	87.78	19.67	44.27
Mid-late	66.79	15.08	15.49	53.84	13.61	44.46	120.62	28.69	59.95	54.59	12.00	12.53	37.91	9.00	33.71	92.41	20.90	46.10
Late	67.68	15.26	15.79	54.60	13.92	44.90	122.28	28.25	60.71	57.34	12.65	13.37	39.05	9.49	35.12	96.80	22.35	48.48
S.E. ±	1.04	0.24	0.22	0.70	0.18	0.50	1.58	0.39	0.64	1.19	0.27	0.28	0.66	0.15	0.62	1.77	0.39	0.88
C.D. at 5%	-	-	-	-	0.52	-	-	-	-	3.46	0.79	0.80	1.93	0.44	1.82	5.18	1.14	4.56
Fertilizers to wheat (kg/ha)																		
40 N + 20 P_2O_5	64.93	14.65	15.07	52.38	13.19	43.60	117.31	27.95	58.68	50.91	11.15	11.64	35.78	8.23	31.81	86.75	19.44	43.47
80 N + 40 P_2O_5	68.09	15.35	15.85	54.52	13.61	45.11	122.62	29.33	60.96	55.37	12.18	12.79	38.18	9.06	34.05	93.54	21.32	46.84
120 N + 60 P_2O_5	67.84	15.31	15.75	52.86	13.92	44.37	121.49	28.92	60.12	56.94	12.53	13.19	39.43	9.52	35.45	96.79	22.06	48.54
S.E. ±	1.04	0.24	0.22	0.70	0.18	0.50	1.58	0.39	0.64									
C.D. at 5%																		

Treatments	1981-82									Total pooled uptake (kg/ha)		
	Sorghum fodder and groundnut pods (kernels + shells)			Sorghum grain and groundnut haulms			Total					
	N	P	K	N	P	K	N	P	K	N	P	K
arif cropping												
rghum (half dose)	49.03	11.15	13.19	44.99	13.12	50.91	94.03	24.30	64.30	102.22	24.99	66.24
rghum (full dose)	65.93	15.21	17.94	58.06	17.80	61.96	123.99	32.79	79.90	130.03	33.39	81.59
oundnut (half dose)	37.49	8.64	7.60	26.28	5.21	13.89	63.77	13.90	21.17	78.16	16.43	26.17
oundnut (full dose)	44.12	10.53	9.16	30.09	6.57	15.84	74.17	17.10	25.00	92.02	20.75	30.99
.E. ±	0.89	0.23	0.27	0.64	0.33	0.72	1.51	0.53	0.96	1.31	0.37	0.80
.D. at 5%	2.83	0.73	0.85	2.10	1.05	2.29	4.83	1.71	3.08	3.80	1.08	2.35
wing dates of wheat												
rmal	47.03	10.87	11.43	37.82	9.93	33.66	84.86	20.76	45.06	97.05	22.86	49.48
l-late	49.81	11.48	12.12	40.31	10.75	36.15	90.13	22.13	48.06	101.08	23.91	51.37
e	50.59	11.79	12.36	41.44	11.35	37.14	91.98	23.17	49.50	103.69	24.89	52.89
.E. ±	0.63	0.16	0.16	0.37	0.11	0.36	0.95	0.24	0.53	0.85	0.18	0.40
.D. at 5%	1.84	0.46	0.47	1.08	0.33	1.05	2.76	0.17	1.54	2.40	0.56	1.14
ertilizers to Wheat (kg/ha)												
0 N + 20 P_2O_5	46.60	10.71	11.34	38.10	10.06	34.34	84.65	20.77	45.41	96.23	22.72	49.19
N + 40 P_2O_5	49.82	11.60	12.10	40.35	10.80	35.94	90.16	22.26	48.03	101.11	24.27	51.94
20 N + 60 P_2O_5	51.02	11.83	12.47	41.13	11.17	36.77	92.15	23.04	49.17	103.48	24.68	52.61
.E. ±	0.63	0.16	0.16	0.37	0.11	0.36	0.95	0.24	0.53	0.85	0.18	0.40
.D. at 5%	1.84	0.46	0.47	1.08	0.33	1.05	2.76	0.71	1.54	2.40	0.56	1.14
eneral Mean	49.14	11.38	11.97	39.86	10.68	35.68	88.99	22.02	47.54	100.61	23.89	51.25

by sorghum was significantly higher than groundnut during all the three years. The application of full fertilizer dose to sorghum significantly increased N, P and K uptake by grain and fodder and total uptake of these nutrients as compared to half fertilizer dose to sorghum during all the three years. Similarly, the application of full fertilizer dose to groundnut resulted in significant increase in N, P and K uptake by pods and haulms and total uptake of these nutrients as compared to half fertilizer dose to groundnut during all the three years. This might be due to increased yields of sorghum and groundnut with full fertilizer dose. Khedkar (1964), Warokar (1965), Welch *et al.* (1966) , Surve (1967) and Choudhari and Tatawawadi (1976) reported that increased doses of nitrogen application increased the uptake of nutrients in sorghum. While Dev and Bhumbala (1967), Puntamkar and Bathakal (1967), Jadhav (1973) and Singh and Ahuja (1985) observed that N and P uptake in groundnut was increased with the increased levels of nitrogen and phosphate fertilization up to recommended level.

The total N, P and K uptake by sorghum was significantly more as compared to groundnut during all the three years and in pooled data except total N uptake during 1979-80. This might be due to higher biomass production by sorghum than groundnut.

Effect of sowing dates : The N, P and K uptake by sorghum grain and fodder and groundnut pods and haulms was significantly more when these *kharif* crops were grown after late sown wheat during 1980-81 and late and mid-late sown wheat as compared to normal sown wheat during 1981-82. The total N, P and K uptake was significantly increased when *kharif* crops were grown after late sown wheat as compared to normal sown wheat during 1980-81, 1981-82 and in pooled data. Futher, it was noticed that the total N, P and K uptake was also significantly increase when *kharif* crops were grown after mid-lat sown wheat as compared to normal sown wheat during 1981-82 and in pooled data. The vegetative growth and dry matter production of wheat were less with later sowing dates. This was mainly because of the rise in temperatures from mid-January which forced mid-late and late sown wheat to mature earlier and this enforced maturity resulted in shorter growing period and consequently low wheat yield and uptake Thus, more nutrients were left unde delayed sown wheat for use by succeedin sorghum and groundnut during kha season and due to timely and adqua rainfall, this residual fertility was effectiv utilized by kharif crops.

Effect of fertilizer levels : The up N, P and K by sorghum grain and fod groundnut pods and haulms, and uptake of these nutrients by sorghu groundnut was significantly incr when *kharif* crops were grown after th application of 2/3 of the recommended an recommended levels as compared to 1/3 the recommended level of fertiliz application to wheat during 1980- 81, 1981-82 and when total N, P and K upta was pooled. This might be due to residu effect of higher levels of fertilizers appli to wheat.

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REFERENCES

BAINS,S.S. 1968. Relay cropping can win the rat increased production. **Indian Fmg.,18** (2) : 9-1

BHARDWAJ, R.B.L. 1973. Multiple cropping syst their problems and prospects. Ministry of Agri 20-23.

CHOUDHARI,S.D. and TATAWAWADI, G.R., 19 Nitrogen uptake studies under different le nitrogen and plant density of sorghum

SH - 2 (CSH - 4). **J.Maharashtra agric.Univ.1** 2-6) : 71-75.

U.P. and BHUMBALA, A.R. 1967. Fertilizer requirements of some **kharif** crops in Punjab. **Fertl. News., 12** (4) : 14-15.

ADHAV,A.S. 1973. Influence of nitrogen and phosphate fertilization on growth, yield and quality of groundnut *(Arachis hypogaea* L.) variety SB XI. M.Sc.(Agri.) Thesis, Mahatma Phule Agril. Univ., Rahuri.

EDKAR P.M. 1964. Influence of graded doses of N on growth, nitrogen content and yield of three varieties of **kharif Jower (***Sorghum vulgare Pers.***).** M.Sc.(Agri.) Thesis, Nagpur Univ., Nagpur.

N,H.S. and KANWAR,J.S. 1968. Review of papers received on cropping patterns in India. AR, New Delhi.

K.R. and AMBIKA SINGH. 1971. Production ential, economic feasibilities and input irements of five high intensity crop rotations rice (*Oryza sativa* L.). **Indian J.agric. Sci.,** 1 (10) : 807-815.

INSON,J.A. and ALLEN,S.E. 1975. Analysis of itrogen, phosphorus and potassiun from plant. Short Comm. in Soil Sci. and Pl. analysis. 6(1) : 1-11.

PUNTAMKAR,S.S and BATHKAL,B.G. 1967. Influence of nitrogen, phosphate and potash on composition, growth and yield of groundnut. **Indian J.Agron. 7** (4) : 345-50.

RANDHAWA,N.S. and MEELU. O.P., 1974. Proc. FAI : FAO Seminar, 403-419.

SINGH,K.O. and AHUJA. K.N., 1985. Dry matter accumulation, oil content and nutrient uptake in groundnut (*Arachis hypogaea*,**L.**) var. T.64 as affected by fertilizer and plant density. **Indian J.Agron.,30** (1) : 40- 45.

SURVE,D.N. 1967. Response of **kharif jowar** (*Sorghym vulgare pers*) var. NJ-156 to N and P fertilization and study of resultant yield surface for specification of economic optima. M.Sc.(Agri.) Thesis, Nagpur Univ., Nagpur.

WAROKAR,R.T. 1965. Influence of graded levels of nitrogen on grwoth, nitrogen uptake and yield of three varieties of **kharif jowar** (*Sorghum vulgare pers*). M.Sc.(Agri.) Thesis, Nagpur Univ., Nagpur.

WELCH, NORMAN, BURNETT, EARL and H.V.ECK. 1966. Effect of row spacing, plant population and N fertilization on dryland grain sorghum production. **Agron.J. 58 (2) : 160-163.**

ras Agric. J., 79 (2) : 71-76, February 1992

EFFECT OF GROWTH REGULATORS ON PRODUCTIVITY IN SAMBA AND THALADI RICES

M.Thangaraj[1] and V.Sivasubramanian

Tamil Nadu Rice Research Institute, Aduthurai 612 101.

ABSTRACT

Experiments were conducted to evaluate and indentify suitable growth regulators to enhance the productivity of rice during the samba and thaladi seasons at the Tamil Nadu Rice Research Institute, Aduthurai using popular rice varieties grown in these seasons. Among several growth regulators tested, irrespective of the variety, foliar spray of Kinetin 20 ppm at heading following by GA_3 25 ppm at panicle initiation and tender coconut water 2% (v/v) at panicle initiation and heading were found to significantly increase the total dry matter, panicle number, grain filling and grain yield by delaying leaf senescence. The increase in grain yield ranged from 8.6 to 30% over control. Considering the cost factor, foliar spray of coconut water appears promising and could be used as a cheaper substitute for kinetin.

KEY WORDS : Rice, Productivity, Growth regulators.

In the cauvery delta region of Tamil Nadu, 70-80% percent of rice is grown only during samba and thaladi seasons (monsoon season : August-January). The major constraints for rice productivity in the samba and thaladi seasons are low light intensity, coupled with low photosynthetic reduction, panicle sterility due to incomplete panicle exsertion and inefficiency of chloroplast pigments. Partial or nonfilling of spikelets during development is a serious impediment in increasing the grain yield. The yield level can be futher raised if the problem of sterility is successfully solved. Besides environmental factors (Satake, 1976) and