Pepartment of Agriculture, Bombay

EXPERIMENTS IN MANURING CROPS IN THE BOMBAY PRESIDENCY 1896-1931

BY

RAO BAHADUR D. L. SAHASRABUDDHE, M.Ag., M.Sc. Agricultural Chemist to Government, Bombay Presidency, Poona



FIRST EDITION

[Price-Rs. 2 As. 9 or 4s. 9d.]

BOMBAY

PBINTED AT THE GOVERNMENT CENTRAL PRESS 1984

Obtainable from the Superintendent, Government Printing and Stationery, Bombay, or through the High Commissioner for India, India House, Aldwych, London, W.C.2. or through any recognized Bookseller

This report was originally prepared in 1931 for the Imperial Council of Agricultural Research. After having abstracted the information they wanted for general use, they have asked the Bombay Government to publish it as a provincial document. It is hence that the report is going out for printing about 30 months after it was first prepared.

In sending this report for publication it is my duty to acknowledge duly the help I received from the various gentlemen. As suggested by the Fertilisers' Committee, Professor M. Vaidyanathan, M.A., L.T., F.S.S., Statistician to the Imperial Council of Agricultural Research, was consulted whenever it was necessary and I am very much thankful to Mr. Vaidyanathan for the valuable advice he gave from time to time in statistical interpretation. My thanks are also due to Dr. R. J. Kalamkar for his useful suggestions in this matter and to Mr. V. S. Abhyankar, B.Ag., for his help in preparing the soil map.

I am greatly indebted to my assistants Mr. N. P. Kale, M.Sc., and Mr. V. Satakopan, M.A.,—to Mr. Kale for his help in collecting data, preparing tables, calculating net profits etc., and to Mr. Satakopan for his help in calculating statistical significance and preparing statistical notes. It was the hard work put by these two gentlemen that enabled me to bring the report out in time.

I am under great obligation of the Superintendents of the various Experimental Stations and their staff for the ready and unhesitating help rendered by them in supplying information and records.

My thanks are due to Mr. S. L. Lele for his help in correcting proofs.

D. L. SAHASRABUDDHE.

POONA, 4th March 1934.

шо-ш Bk Q 7----а

Preface.

Maps-

- (1) Map showing the distribution of soils and experimental Farms.
- (2) Map showing average annual distribution of rainfall in Bombay Presidency.
- (3) Geological map of the Bombay Presidency.

CHAPTER I.

Introduction-

••	••	••	••	1	
1	••	••		1	
Methods used in collecting data and putting them up					
••	••		••	3	
marised	••	••	••	4	
	 l ng them up marised	ng them up 	 I ng them up marised	 l ng them up marised	

CHAPTER II.

Summary of the manurial expe	riments—cı	op by crop		••	••	6
(a) BAJRI		••		••	••	6
(i) Poona Agricultural (College Far	m		••	••	6
(b) CHILLIES		••		••	••	6
(i) Arbhavi Farm		••	••	••	••	6
(ii) Dhulia Farm	••	••	••	••	••	6
(iii) Poona Agricultural (College Far.	m	••	••	••	6
(c) Cotton			••	••	••	7
(i) Arbhavi Farm		••	••	••		7
(ii) Dhulia Farm	••				••	7
(iii) Jalgaon Farm	••	••	••	••	••	7
(iv) Poona College Farm		- <i>i</i>	••	••	••	7
(v) Dharwar Farm	• •	• •	••	• •	••	7
(11) Surat Farm	••	••	••	• •	••	8
(d) FRUIT TREFS		••	••		••	8
(i) Modibag Gardens, P	oona	• •	••	••	••	8
(e) GROUNDNUT		••	••		••	8
(i) Jalgaon Farm	••	••	••	••	••	8
(ii) Poona College Farm	••		• •	••	• •	8
(f) JOWAR		••	••		• •	9
(A) Nilwa		••	••		••	9
(i) Kopergavn Fa	rm			• •	• •	9
(ii) Poona College	Farm	• •		••	••	9
(B) Shalu		••		•••		9
(i) Dharwar Farm						9
(ii) Dhulia Farm	1			••		ğ
(iii) Kopergaon Fa	rm					· 9
(iv) Maniri Dry Fa	TID			••	••	10
(v) Nadiad Farm	••	••				10
(vi) Poona College	Farm	••				10
(vii) Surat Farm	••	••	••		••	10
мо-ні Вк Q 7b						

PAGE

.

••	••	••	••	••	10
		••	••	••	10
••	••	••	••	••	10
	••		••		10
••	۰	• •			10
		• •	• •	• •	11
••	••	••		••	11
		••	••	••	11
••	••	• •		••]]
••	••	••	••	••	11
••		••	••	••	12
	••	••	••	••	12
••	••	• •	••	••	12
	••	••		••	12
	••		••	••	13
••			••	••	13
• •		• •	••	• •	13
		••	••	••	13
					14
					14
••	••	••	••		14
•• .	••	••	••	••	14
			••	••	14
	••	••	••	••	14
••		••	••	••	14
				··· ··· ··· ··· ··· ··· ··· ··· ··· ··· ··· ··· ··· ··· ··· ··· ··· ··· ··· ··· ··· ··· ··· ··· ··· ··· ··· ··· ··· ··· ··· ··· ··· ··· ··· ··· ··· ··· ··· ··· ··· ··· ··· ··· ··· ··· ··· ··· ··· ··· ··· ··· ··· ··· ··· ··· ··· ··· ··· ··· ··· ··· ··· ··· ··· ··· ··· ··· ··· ··· ··· ··· ··· ··· ··· ··· ··· ··· ··· ··· ··· ··· <	

CHAPTER III.

Manurial experimen	ts with t	he conclusio	ons drawn fi	rom them	••	••	15
General	••	••	••				15
I. Alibag Farm	••	••	••	••	••		15
General		••	• •	••	••	•••	15
(i) To ascert and with	ain the e hout bon	effects of <i>1</i> c-meal as a	Karanj leav manure for	ves (Ponga rice	mia glabra), with 	16
(ii) To ascert: over no-	ain the ei manure	fect of Fish for rice	manure (at	the rate of	20 lbs. N. p	er acre)	17
(iii) To ascert on rice (ain the e rop	ffect of incr	tasing dose	s of N. in t	he form of :	manure	17
(iv) To ascert compare	ain the d to no-1	effect of 1 manure on 1	Bone-meal (rice crop	equivalent	to 20 lbs.	N. as	17
(v) To ascert cake on	ain the c the rice	flect of 20 l	lbs. of N. p	er acre in t	he form of	Karanj	17
(vi) To comp ammoni with th phospha	are the a 112 lbs e combin ite 112 lb	effects of , per acre w nation of su os.	no-manure fith superpl alphate of a 	treatment hosphate 11 ammonia 1	with sulp 2 lbs. per a 12 lbs. and	hate of cre and super-	18
(vii) To ascert	ain the e	ffects of th	e following	manures or	ı rice ;—	٦	
(a) N	o-manur				••		
(6) <u>M</u>	ohua (Ba	ista iatifolia soo li	i) refuse 90	lbs	••	1	10
	rine eart	500 108. h 74 1he	••	••	••	٠.٢	10
(e) Pe per action	udrette	222 lbs.	••	••	••	}	
Conclusion		• •		••	••	·	18
II. AMALSAD FARM	· • •	••	••	••		••	18
General (i) To com	pare the	effects of lo	cal manuri	ng with an	d without	100 lbs.	18
of Nitro sugarca	gen as a ne	mixture of	Castor cake	and sulph:	ate of amm	onia on	19

								PAGE
III, An	BHAVI FARM		••	••	••	••	••	19
Gene	ral					• •		19
6)	To compare	the effect	of sheep	folding,	Poudrette	and F.Y.M	. on	
	Sugar-cane	erop	·· `	••	••		••	20
(ii)	To ascertain	the comp	arative effe	ects of	ר			
(1-)	(a) Poud	rette,	••	••	j			
	(b) Trash	tand ≰_uao n	• •	••	<i>}</i>	••	••	21
	per acre as	n. an 20,0 basic mar	ure to Sug	arcane				
<i></i>	<u>т</u>	1			, 			01
(111)	To compare o	ine enects	of differen	i unp-ares	isings on su		••	21
(68)	and mixture	e of oil cal	kes and sul	phate of a	immonia to	sugarcane		21
(<i>v</i>)	To compare f given with s	the effect sulphate o	of mill-pre f ammonia	ssed and as top-dr	<i>ghani-</i> press essing to su	ed oil cake v 1garcane	vhen 	21
(vi)	To compare ammonia as	the effect top-dress	of ground ing to suga	nut cake arcane	alone and	with sulphat	e of	21
(vii)	To compare .	Ammopho	s and grov	ndnut ca	ke as top-d	ressing to su	gar-	
• •	cane .	•	••	••	•• *	Ö		22
(viii)	To compare (the effecte	of ground	nut c ak e,	ammophos	and sulpha	te of	00
	ammonia al	one or in 1	mixture as	top-dress	ing to suga	rcane	• ·	22
(ix)	To compare !	the effects	of the foll	owing tre	atments as	top-dressing	s for]	
	sugarcane :		00 lba ⊥ f	roundru	t ooke 75 lb	a N. + aulo	hate	
	of amo	ionia 75 l	bs, N.		••	••	}	
	(b) Ground	nut cake	75 lbs. N	+ sulphat	e of ammo	nia 75 lbs. N		22
	(c) Ammop	hos 150 hos 150 N) 168. N.	••	••	••		
	(u) minuop							
(x)	To compare	calcium c groundni	yanamine ut cake as f	+ groun on dressi	anut cake ng ta sugar	with sulfuer cane	AC 01	22
	m and a state of the state of t	1 4 11						
(xi)	To compare ((a) Sheen d	the follow	ing bulky i	nanures t	or maize cr	op :		
	(b) F.Y.M.	une .	•••	••	••		[
	(c) Poudret	to	••	••	••	••	- • f	22
	(a) Kotted	CACTUS	••	•••	••	••		
1.12	(c, c.,	41				for Males	5	
(xii)	(a) No-man	ъле епосъ шле	of the folic	wing but	ky manure:	s for Maize :-		
	(b) F.Y.M.		•		••	••		23
	(c) Urine es	irth and .	• •	••	••	••	•• [20
	(a) Pouaret	.te .	•	••	••	••	••)	
(xiii)	To ascertain season com	the effect pared wit	s of the fol n fallow be	lowing gr fore rabi	een manur maize	es in the <i>Ki</i>	harif	23
(xiv)	To ascertain	the effect	s of increa	sing dose	of F.Y.M.	on maize cro	·P••	23
(xr)	To compare	the effects	• of					
	(a) $7.5 tc$	ons F.Y.M	I. and	••	••		••]	
	(b) 5 tons ber aere on	s F.Y.M maize	⊢ Groundin • •	nt cake (40 lbs. N.	••		23
(zri)	To ascertain	the effec	t of calci	um evan	amide as	top-dressing	on	
()	cotton crop)	••		••	· ·	•••	23
(xrii)	To compare t	he effects	of 28 lbs. N	, in vario	us forms of	artificials a	long	
,	with basic 2	2.5 tons h	.Y.M. per	aere on c	otton	••	••	24
(xviii)	To compare without any	the effects	s of 28 lbs. anure for a	N. in the ottop	e form of v	arious artifi	rials.	94
(min)	To ascertain	the office	tanf FV	1 7 tone -	·· rith F V M	•• 5 tone ± 40	lbe	~1
(***)	N. as top-di	ressing for	r chillies	4. 7 COH3 9		•••		24
(xx)	Conclusions	0	••		••	••	••	25

ł

-

				-			PAGE
IV. BAI	ramati Farm		••	••	••		25
Gene	ral	•••		••		••	25
(1)	To compare the effe green manuring t matter per acre on	cts of differ o make up 2 sugarcane	ent quantitie 20,000, 30,0 • •	es of F.Y. 00 and 40	M. added 1,000 Ibs. 	to san of dry	25
(ii)	To compare the ef (Pandya) : (a) San green + (b) San green + (c) 40 carts F.Y	flects of the 150 lbs, N. 12 carts F.Y. .M. + 5,000	e following for top-dres X.M. + 150 I blbs, of oil	treatment ssing bs. N. for cakes	ts on sug top-dressi	arcane	25
(iii)	To ascertain the e "D 109" variety (a) San green + half as sulpha (b) F.Y.M. 30 c	effects of the and also on F.Y.M. (12) the of ammorphism arts $+$ 5,00	ne following "Pundya" learts) + 15 nia) 0 lbs, of cak	treatme variety :- 50 lbs. N. 4 e	nts per a (balf as ca 	ke and	26
(iv)	To ascertain the ef sugarcane	fect of incr	easing doses	of N. for	top-dress	ing for	26
(v)	To ascertain the eff per acre with 30 c	ect of increa arts F.Y.M.	sing doses of per acre for	f Nitroger sugarcane	for top-d	ressing	26
V. DHA	RWAR FARM		••			••	26
Gene	ral	••			• •	••	26
(i)	To compare the las (a) Crude night so (b) F.Y.M. and (c) also to compa jowar and cot	sting effects il re them wi ton rotation	of heavy ms	anuring or	of manur	with— ·· ing to ··	28
(ii)	To ascertain the eff rotation	ect of increa	ising doses o	fFYM.	for Jowar-	cotton 	29
(iii)	To ascertain the eff rotation	ects of var	ious bulky	manures (on Jowar.	cotton	30
(iv)	To compare the eff cotton rotation	ect of Moh	ua refuse wi 	th no-ma	nure for .	lowar-	31
(v)	 (a) To ascertain the orac cakes as top-dressing (b) To ascertain the in "Va" with 2 monotonic content on the second content on the second case of t	effect of 201 ng over no t effect of 201 tons of F.Y.	bs. N. per ac op-dressing lbs. N. per ac M. as basic	re in the fo to Jowar- re in the manure	orm of vari cotton rot. form oil-ca to <i>jowar</i> -	ation. akes as cotton	31
(vi)	To compare the off F.Y.M. of the sam rotation	ect of 10 lb e money va	s. of N. as: lue given e	sulphate « very year	of ammoni to <i>jowar</i> .	a with cotton	31
(vii)	To ascertain the ci sulphate of ammon with jowar	fect of sup his and their	erphosphate, r combinatio	, sulphate ms given	of potasi to cotton i	h, and rotated	32
(viii)	To compare the off along with basic jowar-cotton rotat	ects of 1011 F.Y.M. with ion	bs. N. in var h the effect	ious form of basic	sin combi F.Y.M. al	ination one on	32
(ix)	To ascertain the co (a) Ammophos (b) Sulphate of (c) Safflower cal each: equal to 20 rotation	mparative e ammonia ke, lbs. N. per	ffect of sacre as top	 p. dressing 	to jowar.	eotton	33
(<i>x</i>)	To compare the effe	ects of F.Y.I on jouar-co	M. with its c tton rotation	ombinatio n	ons with d	ifferent	33
(21)	To compare the e manures on jowar-	ffects of the cotton rotat	e different tion	combina	tions of	several	33
(xii)	To compare the o to cotton	effects of t	he different	t top-dre	ssings pe	r acre	34
(2111)	(a) To compare the	effects of th	e different a	rtificials o	n jowar	••	34

•

iv

					r
(b) To compare the of complete rotation	fects of the	manures in ad cotton	(xiii) (a) on cotton	and on
Summary of the result	8				
Г. Притта Барм				•••	
General	••	••	••	••	
(i) To compare the	for stoeffe	no-manure	т. БУМ	۰۰ مەط مەلەر	hate of
ammonia on cott	on				
(ii) To compare the effective	fects of sul	phate of am	monia w	ith no-man	are for
cotton	• •	• • •	• •	••	••
(iii) To compare the	effects of	10 tons of	F.Y.M.	with no-	manure
on jowar	••		••	••	••
(w) To compare the eff and safflower cak	ect of F.Y.M e on sugare:	L with its co ane	ombinati	on with cast	or cake
(v) To compare the	effects of	the various	manure	s (each =	20 lbs.
potash) on chillie	s	• •	٠.	• • •	••
(vi) To compare the eff superphosphate o	lects of F.Y. n chillies	.M. with its	combina 	tion with ni	tre and
(vii) To compare the ef	fects of 3 to	ns of F.Y.M	l with a	dditions of	10 and
20 lbs. of N. as st	ulphate of a	mmonia on	Wheat	••	• •
I. DOHAD FARM					
General			••		
(i) To compare the of	fect of 10 c	arts F.Y.M.	DEL BUL	with that	of san
green manure for	Rice (irriga	ted)		••	••
(ii) To compare the effe acre on paddy (ir	cts of F.Y. rigated)	M. 30 carts :	and cast	or cake 600	lbs. per
(iii) To compare the eff	fects of-				
(a) Castor cake			ן		
(b) Sulphate of (c) San green	ammonia a	nd	ł	••	
each equal to 15 1	bs. N. for B	lice (irrigate	d)		
(iv) To compare the eff	ects of—	. 0			
(a) F.Y.M.		•• .)		
$(b) \mathbf{F} \cdot \mathbf{Y} \cdot \mathbf{M} \cdot \mathbf{+} \mathbf{s}$ $(c) \mathbf{San} \mathbf{snorm} \mathbf{s}$	ulphate of a nd	mmonia	ł		
(d) San green -	- castor cal	•• (e. ••	i	••	••
per acre, on irrige	ted paddy	••	J		
(v) To compare the efacte, with no-may	feets of 30 ture, for <i>Kh</i>	carts F.Y.M	I. and 20	carts F.Y.	M. per
(m) To compare the effe	ets of Urin	earth and c	attle dur	a on Khari	··· / maizo
(vii) To compare the effe	ets of 150 lb	s. and 300 lb	s of nitz	ig on many ato of sode r	ALGIAN
on Kharif maizo		···	••	••• ••• •••	•••••••••••••••••••••••••••••••••••••••
II THEORY FURK					
O a constant	••	••	••	••	• •
General	•• • • • • • • • • •		••	••	••
(1) To ascertain the el	rect of dine	rent manuri	al treatn	ients on cot	ton
(11) (a) To compare the	effect of F	Y.M. and c	astor cak	e on cutton	
(0) To compare the effe	ets of F.Y.	M. and grou	ndnut h	18k on cotte	m ••
(iii) To compare the eff	ects of incre	easing doses	of casto	cake on co	tton
(iv) To ascertain the e cotton	ffect of 400	0 lbs. and 8	300 lbs.	of Mohua	cake on
(v) To compare the effe	ects of equal	doses of cas	tor cake	and Mohua	ake for
(vi) To ascertain the ef nut cake, nitrate	fects of F.Y. of soda and	.M. with its sulphate of	combina ammoni	tions with j a on cotton	ground-
(vii) To compare amn	ophos wit	b castor c	ake on	equal basi	s of N.
for cotton			•••	- 1 10001	

۷

.

Y.M. in combina- tton	those of of soda on o	F.Y.M. wi s of nitrate	e the effects of increasing dos	To compare tion with in	(viii)
oundnut cake with or cake on cotton.	ations of g nia and ca	the combinate of amm	n the effects o soda and sulpt	To ascertain nitrate of so	(ix)
of ammonia with	and sulphs	ammophos on cotton	n the effects o ut castor cake	To ascertain and withou	(x)
lphate of ammonia	amide and i on	alcium cyar cake on cot	n the effects of vithout castor	To ascertain with and w	(xi)
f ammonia with or	nd sulphate op	mmophos a oundnut er	n the effect of . stor cake on g	To ascertain without cas	(xii)
	••	••	••	arjat Farm	(X. KA
•• ••	••	••		ral	Gener
e form of sulphate	ses of N. in	creasing do	n the effect of i in on Kolamba	To ascertain of ammonia	(1)
monia (60 lbs. N.).	lphate of a	bution of su	n the best distr	To ascertain	(ii)
ate of ammonia on	oses of sulp er bunch	ncreasing d ng (culms) j	n the effect of mber of seed!	To ascertain varying nu	(iii)
f N. ploughed into	ring 60 lbs.	reen manu ting	n the effect of effore transplat	To ascertain the land be	(iv)
			RM .	PERGAON FID	X Kor
	••			ral	Gener
ammonia, castor	sulphate wa (Jowar)	ve offects of nure, on Ni	the comparat M. and no-ma	To ascertain cake, F.Y.M	(i)
groundnut cake,	of ammoni car)	f sulphate n Shalu (Jo	the effects d no-manure of	To ascertain F.Y.M. and	(ii)
ings for sugarcane	ent top-dres	the differ	e the effects o d rateon	To compare planted and	(iii)
nous top-dressings cake for sugarcane.	ses of nitro nd safflowe	icreasing de ammonia a	the effects of i of sulphate of	To ascertain in the form	(iv)
	••			IMTA FARM	KI. Ku
		••		ra)	Gener
hout F.Y.M. as a	with and w	bone-meal	n the effects of r rice	To ascertain manure for	(i)
ulsta omica	g for rice : ninalia pan chnos nux	he followin aves of Ter aves of Str	the effects of neal + green l neal + green l	To compare ((a) F.Y.M. (b) Bone-m (c) Bone-m	(ii)
•• ••	ulata and mice	inalia panio	leaves of Term	(d) Green lu	
mmonia and their	ulphate of	F.Y.M., s	n the effects of only of the other of the other of the other of the other othe	To ascertain	(i ii)
sphate and their	Rock Pl	of F.Y.M.,	n the effects	To ascertain combinatio	(ir)
and without leaves	sphate with	Rock Pho	e the effects o M. for rice	To compare with F.Y.M	(<i>v</i>)
nout F.Y.M. and of	with and w	Ammophos 	n the effects of one for rice	To ascertain F.Y.M. alor	(vi)
ombinations with rrice	nd of its bone-meali	of F.Y.M. s amide and	n the effects s, calcium cya	To ascertain Ammophos	(vii)
out F.Y.M. for rice.	ith and wit	one-meal w	ı the effect of	To ascertain	(viii)
t F.Y.M. with that	th or withe	one-meal w	the effect of for rice	To compare of F.Y.M. f	(<i>ix</i>)

(x)	To compare the effect	t of the fol	lowing m	anures for	rice : —	_	
	(a) F.Y.M.(b) Bone-meal and		•••	••	•••	···}	_ 5
(xi)	(c) Bone-meal $+$ gr To ascertain the effe	een leaves ct of F.Y	 .M., ճակր	hate of an	 nmonia and	ر their	_
(xii)	combination for rice To ascertain the effect	et of F.Y	.M., eulpi	 ate of am	 monia and	their	5
(xiii)	combination for rice To compare the effec	, on high-l t of manu	ying land ring by ti	ne local me	 thods, 5 ca	 .rts of	5
(F.Y.M. with no-man	ure for ric	e on all t	ypes of lan	ds	••	5
(xw)	Daskabbu varieties c	ts of the v of sugarcar	ALIOUS MS	.nureson r	ved Mauriti	us and	5
(<i>xv</i>)	To ascertain the effect Mauritins and Dash	ts of vario	us manui	es with bas arcane	sic F.Y.M. f	or Red	ŗ
(xri)	Conclusions	••	••	••	••		5
XIL N	TANJEL FARM						ş
Gene	ral						2
(i)	To study the possib (30.000 lbs, per acre	oilities of	reducing	the basic	dose of 1	F.Y.M.	-
(ii)	To compare effects of manure as basic ma:	F.Y.M., a nure for su	in green, Igarcane	Sugarcane	trash and	stable	ł
(iii)	To ascertain the effe F.Y.M. or oil cake-	et of supp —to make	lementing up 200	; basic <i>san</i> Ibs. N. pei	green man r acre—for	ure by sugar-	
(i v)	To ascertain the mos	•• t economic rargane	and effic	ient substi	tute for F.Y	.M. as	,
(v)	To compare the eff	feets of 3	0,000 lb	5. F.Y.M.	with and w	 vithout	ļ
(vi)	To ascertain the effect	t of varying	ng quanti	ties of Nitr	ogen used f	or top-	,
(vii)	To ascertain the effe	ect of var ne	rying qu	antities of	Nitrogen	as top-	•
(viii)	To ascertain the effect	t of increa	sing dose	s of Nitrog	en as top-di	ressing	
(ix)	To compare the effect for sugarcane	ts of Nitro	gen in va	rious form	s for top-di	ressing	
(<i>x</i>)	To compare the effect top-dressing for sug	ts of sulph arcane	ate of am	monia and	nitrate of s	oda as	
(xi)	To ascertain the nun Nitrogen top-dressin	aber of do ng to get b	ses and t est result	ime of the stor sugare	eir applicati eane	ion fo r	
(xii)	To ascertain the bes	st combin	ation of	water-cum	-top-dressi	ng for	ļ
(xiii)	To ascertain the effe- and 40 lbs, of Phost	et of <i>Gurh</i> boric acid	al ashes c	ontaining	100 lbs. of :	Potash	
(xiv)	To ascertain the effect the top-dressing of s	ts of addi sugarcane	tions of P	otash and P	hosphoric a	scid in	
XIII.	Manjri Dry Farm	••	••	••	••		
XIV. 1	Modibag Gardens	••	••	••	••		
Gene	eral	••	••	••	••		
(i)	To ascertain the comp and Bone-meal, per	parative ef plant on l	lects of F. Banana pl	Y.M., Poud ants	rette, Casto	r cake	
(ii)	To ascertain the effe	cts of diffe	rent man	irial treatn	ents on fig	plants.	
(111)	To ascertain the effect	ts of differ	ent manu	res on Pom	egranate pla	ints	
(iv)	To ascertain the effec	ts of the d	ifferent m	anures on (Drange plan	ts	

vii

PAGE

		,					PAGE
XV. N	ADIAD FARM	••	••	••	••	••	63
Gene	ral	••	••	••	••	••	63
(i)	To compare san g	reen manure	with F.Y.	M. for irrige	ted Tobs	. 00	63
(ü)	To compare the ((irrigated)	effects of dif	ferent mar	urial treat	ments on a	tobacco	64
(iii)	To compare the e Tobacco under s	effects of diff hallow and d	erent man leep tillage	urial treatn	uents on in	rigated	64
(iv)	To compare the ef on tobacco (irrig	fects of diffe ated)	rent combi	nations of	various n	aan urcs	64
(v)	To compare the manure for rice	effects of F.Y (non-irrigate	(.M. alone d)	and with 1	nitre again	oat no-	65
(vi)	To compare the (irrigated)	effects of	F.Y.M. at	nd F.Y.M.	+ nitre	on rice	65
(vii)	To compare the e on Sundhia Jow	effects of Urin ar	ne earth ar	nd cattle du	ng on catt	e-dung	65
XVI. P	'OONA AGRICULTU	ral College	Farm	••	••	••	66
Gene	ral .	۰.		••		••	66
(i)	To compare the artificial fertilise	effects of rs with no-m	various co anure trea	mbination: tment on j	s of F.Y. owar (Nilw	M. and a)	66
(ii)	To compare basic forms on Shalu	F.Y.M. with Jowar (Rabi)	additions	s of 10 lbs. 1	itrogen in	various	67
(iii)	To compare basic on Shalu Jowar	F.Y.M. with (Rabi)	additions	of nitroger	n in variou	s forms	67
(iv)	To ascertain the on <i>Jowar</i>	comparative	e effects of	different c	bemical fe	rtilisers	67
(v)	To compare the end of the state of the state of the second state o	ffects of basi per acre in	ic F.Y.M. various for	(5 carts) - ms on Bajr	with addit i	ions of	68
(ri)	To compare the e Nitrogen in vari	ffects of 5 ca ous forms on	arts of F.Y Bajri	.M. with a	dditions of	10 lbs.	68
(vii)	 (a) To compare so (b) To compare so (c) To compare equal to 20 poudrette per 	an green witt an green witt sulphate of a lbs. Nitroge r aere	h 10 carts h 10 carts ammonia en, being	poudrette j F.Y.M. per with nitrat given in a	er acre aure te of soda addition to	$\left.\begin{array}{c} \cdot \\ \cdot \end{array}\right\}$	68
	(d) To compare s soda 20 lbs.	ulphate of a N., both in a	mmonia (ddition to	= 20 lbs. N 5 carts F.Y	.) with ni Y.M. per ac	trate of	69
(riii)	To compare the of ammonia and	effects of n sulphate of :	o-manure, ammonia c	F.Y.M., H m " Pusa 4	Y.M. + s "wbeat	ulphate ••	69
(ix)	To compare the el ment ou cotton	ffects of the d	lifferent fei	tilisers wit! ••	h no-manu: •-	retreat-	69
(<i>x</i>)	To compare the superphosphate	effects of + sulphate c	F.Y.M. w of potash of	ith F.Y.M n wheat "C	[. + amm o N. R.'' vai	phos + iety	69
(xi)	To compare the combination wit	effects of F. th that of no	Y.M., sul manute of	phate of a n wheat	mmonia aı	nd their	69
(xii)	 (a) To ascertain t a mixture of phosphate or (b) To ascertain to pondrette 	the effect of t of poudrette a groundnut the effect o on groundn	the additio with sul "Spanish p f the addi ut (Spanis)	n of sulphi phate of p peanut vari ition of sul n peanut va	ate of amn ootash and ety '' lphate of a ariety)	mmonia to	70
(xiii)	To compare the e artificial fertilis manure	ffects of the sers on grou	different undnut (E	combinatio Sig Japan	ons of F.Y. variety) v	M, with with no-	70
(xiv)	To compare the e- various forms of	ffect of F.Y. n groundnut	M. with ad (Spanish I	ditions of 2 manut varie	0 lbs. Nit ety)	rogen in	70

			PAGE
(XV)	To compare the following treatments— (a) Poudrette 12 carts + nitrate of soda 160 lbs. + Thomas s 200 lbs. (b) The above + subplate of ammonia 224 lbs.	lag	71
	on chillies	J	
(xvi)	To ascertain the effect of 20 lbs. N. in various forms in addit to 20 lbs. of N. as F.Y.M. for chillies	ion	71
(xvii)	To ascertain the effects of 20 lbs. N. in various forms in addition 20 lbs, of N. as F.Y.M. on chillies	. to	71
(xviii)	Comparison of various treatments on Potato	••	71
(rir)	To compare certain treatments on onions	••	72
(<i>xx</i>)	To compare the effects of additions of 20 lbs. N. in vari- forms of artificials to the basic 20 lbs. N. as F.Y.M. per acre	0118 : 010	70
(xxi)	To ascertair the comparative effects of chemical fertilisers	on	72
<i>,</i>	irrigated onions	••	73
(<i>xx</i> **)	(irrigated)	eric	73
(xxiii)	To compare certain manurial treatments on Cabbage and Kr	101-	73
(xxiv)	To compare the effects of groundnut cake, complete manure a	nd	72
(xxv)	To compare the effects of F.Y.M., complete manure and sulphate	e of	74
(xxvi)	To compare the effects of different manufial combinations	on	**
	The second	••	14
(22111)	be applied in December-to 60 carts F.Y.M. applied every year 3 doses, to Lucerne	10 r in	74
XVII.	Ratnagiri (Shirgaon) Farm	••	75
Gene	ral	••	75
(i)	To ascertain the effects of various bulky manures for Rice-crop "Low-lying" i.e., "Mala" lands	on ••	76
(ii)	To test the effect of night soil and poudrette with each other and w no-manure on low-lying lands for rice	rith ••	77
(iii)	To test the effects of <i>Rui</i> (balotropia gigantia) leaves on low-lying la for Rice	nds	77
(iv)	To test the effects of Bone-meal and groundnut cake with each of and with no-manure for rice on low-lying lands	ber	77
- (v)	To compare the effects of sulphate of ammonia, Fish manure and u cake, with each other and with no manure for rice on low-ly	ndi 7ing	
(vi)	lands	••• of	77
	ammonia and undi cake, with each other and with no-manure rice	fer ••	77
(vii)	To compare the effects of some oil cakes with each other and with manure on rice in low-lying lands	во- • •	78
(viii)	To compare the effects of Fish manure and bonc-meal with each of and with no-manure on rice crop in low-lying lands	ther	78
(<i>ix</i>)	'io ascertain the effects of bone-meal equal to 10 lbs. N. per acre rice in low-lying lands	e on	78
(x)	To ascertain the effects of Rock-phosphate on rice in low-ly lands	ing	78
(<i>x</i> i)	To compare the relative effects of various manures on rice c in high-lying or Kuryat lands in addition to the basic F.Y 10 carts	nop .M.	70
i MO .17	TBk 0 7-c	••	19

.

						PAGE
XVIII. SURAT FABM	••	••	••	••	••	79
General	••	••	••	••	••	79
(i) To ascertain the co at tho rate of 5 : cotton-jougr rota	mparative tons per tion	effects of v acre every	arious bull second y	cy manures ear to cot	applied ton for	80
(ii) To ascertain the e applied to cotton	ffect of in in the col	ereasing do: ton-jowar 1	ses of F.Y.) otation	M, when m	anure is	80
(iii) To compare the eff on cotton-jower	ects of various	rious F.Y.M	. treatmen	ts with no-	manure	81
(iv) To compare the 2.5 tons of F.Y.I	Dharwar M. every y	and Surat ear in cotto	systems n-jouar rol	of manurin ation	ng with	81
(v) To ascertain the cotton-jowar rote	comparativition	ve effects of	night-soil	and F.Y.M	on the	81
(v) (a) To ascertain (and no-manure of	the compa	rative effect	ts of poudi	rette and n	ight-soil	82
(vi) To compare the el on cutton-jowar	fects of G rotation	ypsum, and	F.Y.M. wi	th that no-	manure	82
(vii) To judge the resi block-cattan soil	dual effect	t of F.Y.M.	. on cotto	n-jowar roti	ation in	89
(viii) To study the com	parative ef	feets of vari	ous oil cak	es applied t	o cotton	99 89
(ix) To compare the o	effects of d	lifferent ar	tifici s ls on	the cotto	n-jourar	02 04
(x) To ascertain the F.Y.M., no-man	effects of : iure and	nitre, calciu calcium	m nitrate, cyanamide	sulphate an on cotto	nmonia. 2011-jourar	°4
(zi) To ascertain the	comparat	ive effects	of no top	-dressing,	ealcium	83
nitrate and sulp (xii) To ascertain the e	nate of am flects of va	monia on ec rying quant	ities of N. :	rotation supplied in	lífferent	. 83
forms on cotton (xiii) To ascertain the c	-jowar rota effects of v	tion	 tities of N.	••• supplied in (different	83
forms on cotton	-jowar rote	ition	••	••		84
(xiv) To ascertain the and F.Y.M. + rotation	effects of l calcium n	itrate + su	erphosphat perphospha	e + calciun te on jowa	n nitrate r-cotton	84
(zr) To ascertain th ammonia + suj + superphosph cotton rotation	ne compa perphospha ate + F.1	rative effect te + F.Y.M C.M. + pots	ts of F. I., and sub asium ch	Y.M., sulp lphate of a lloride on	hate of mmonia jownr-	84
(xvi) To ascortain the tuents singly ev	comparat ery two y	ive effects o ears to cotto	f supplying n	g plant food	l consti-	85
Extracts from "Rep Professor J. B. Knip	port on sht	Sewage Ex	periments	near Pool	na" by	85

CHAPTER IV.

Detailed data with statistical notes on the experiments 87 ... •• ۰. 88 I. ALIBAG FARM ٠. •• • • Data and notes on experimenta 1 to 7 .. 88-94 • • ۰. Table giving cost of cultivation and prices of the produce 95 •• ... Table giving prices of manures •• 95 • • •• •• 96 II. AMALSAD FABM •• •• • • •• . Data and notes on experiments 1 to 3 96-97 • • • • ...

i.

X

.

						PAGE
III. ARBHAVI FAF	ам	••		••		98
Data and not	es on experiments 1 to	19	••			98-112
Rainfall table		••		••		112 - 113
Table giving	prices of the produce	••	••	• •	• •	113
Table giving	prices of manures	••	••	••	• •	114
IV. BARAMATI FA	RM	••		••		115
Data and not	es on experiments 1 to	5	••	• •		115-118
Table giving	cost of cultivation and	prices of m	anures and	produce	••	118
V. DHARWAR FAR	м					118
Data and not	es on experiments 1 to	135		••		118-169
Table giving	cost of cultivation					170
Table giving	prices of produce					171
Rainfall table				••		172-173
Table giving	prices of various manu	tes	••	••	••	174-175
VI DURITA FARM	r					176
Data and not	es on experiments 1 to	7	••	••	•••	178-179
Table giving	urices of produce and c	f various m		••	•••	179
Reinfall table	billes of Produce and c		unu co		•••	180
Trainian IGOR	••	••	••	••	••	100
VII DORAD FAR	N					181
Data and not	es on experiments 1 to	7				181-184
Rainfall table	• • • • • • • • • • • • • • • • • • •					185-186
	· · ·				•••	
VIII. JALGAON F.	ARM	• •		••		187
Data and not	es on experiments 1 to	126		••		187-204
Rainfall table	· · ·	••	• •			205
Table giving	cost of cultivation	••	••	••	۰.	206
Table giving	prices of produce		••	••	••	206
Table giving	prices of various manu	res	••	••	••	206
1977 17 . 17 .						0.0
IA, KARJAT FAR	M		••	• •	••	207
Data and not	es on experiments 1 to	4	••	•••	•••	207-211
Table giving	anima of manuscrand.		••	• •	•••	211~212
TROK SUIDS	prices of manufes and	or foreignes	••	• •	••	212
X. KOPERGAON F	ARM					212
Data and not	es on experiments 1 to	4				212-215
Rainfall table	· · · · · · · · · · · · · · · · · · ·					216-217
Table giving	prices of various manu	res and of p	roduce	••	••	218
	_	-				
XI. KUMTA FARM	t		••	••	• •	218
Data and not	es on experiments 1 to	15	••	••	••	218 - 233
Table giving (cost of cultivation	••	••	••	••	233
Table giving i	rates of various manur	88	••	••	• •	234
Rainfall table	• ••	••	••	••	••	235
XII, MANJRI FAR	м					936
Data and not	es on experiments 1 to	14	••	••	•••	236-247
Table giving	rost of cultivation and	rate of Gui	sold			247
Table giving	the rates of various ma	nures				248
Rainfall table	e			••		249-250
WITT MANA						
AIII, MANJRI DE	AT LARM	••	• •	••	• •	251
Data and not	es on the experiment 1		••	••	••	251-253
XIV. MODIBAG G	ARDENS					929
Data and not	es on experiments 1 to	4	••		••	200
Table giving	prices of manures	-		••	•••	957
		-			••	201
XV. NADIAD FAB	л	••	••	••	••	258
Data and not	es on experiments I to	7	••	••	••	258 - 262
XVI Poor Cor	FOR FARM					0.00
Dote and+	SEGE FAEM		••	•• •	•••	262
Rainfall to bl	es ou experiments 1 to	41	••	••	••	202-292
	••	••	••	••	••	293-294
\$						

XI

							Page
XVII. RATNAGE			• •	294			
Data and no	• •	••		294-306			
Rainfall tab	le	•••			••		306-307
Table giving			307-308				
Table giving	ý prices o	of various man	ures	·		••	308
XVIII. SURAT F	ARM		••			••	309
Data and no	tes on e	xperiments 1	to 16	••			309-335
Rainfall tab	le						336-338
Table giving	cost of	cultivation					339
Table giving				335			
Table giving	••	••	••	340			
XIX. SEWAGE E	SPERIM	ents, Poona 1	FARM	••	••	••	341
Appendix	••	-	••	••		••	345
Method T		••			`	••	345
Method H							346
Method III							347
Method IV	••	••	••		••	•••	348
INDEX	••		••	•••	-		351
(i) In the al		••		351			
(ii) In the alp	••• ¹			358			