

192

The Madras Agricultural
Journal

1931 - August
Vol. 19. No. 8

JL
Jm 211, N13
N31-19-8
94579

'KOSPLOS'

KOSSEIR GROUND PHOSPHATE

Phosphoric Acid Content 30/32%

Fineness—90% through 200 mesh sieve.

Distinctive Advantages—

1. Finest Ground Fertilizer on the market.
2. Fineness is guarantee of availability of Phosphoric Acid.
3. Cheapest Unit Value Phosphoric Acid in the market.

**THE IDEAL ECONOMY
FERTILIZER FOR BOTH
PLANTERS AND RYOTS**

For prices and particulars, write to:—

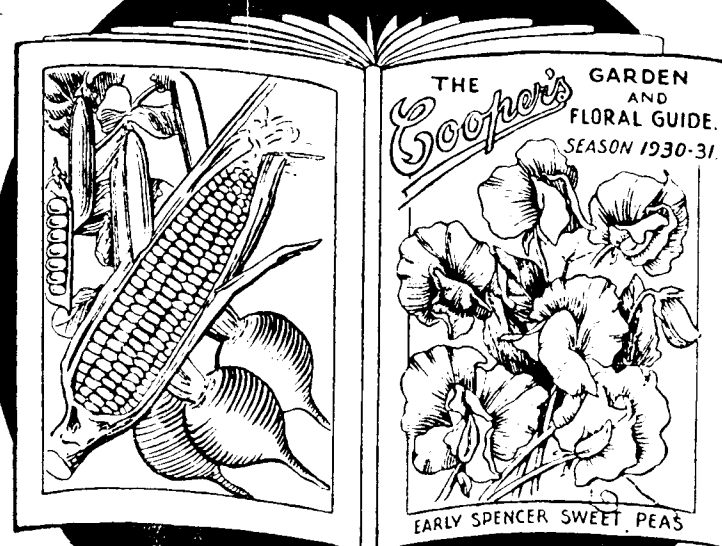
PARRY & CO., LTD.,

RYOT SALES DEPT.,

RANIPET, North Arcot.

When answering our advertisers, please mention 'The Madras Agricultural Journal'.

COOPER'S FLOWER & VEGETABLE SEEDS



Catalogue FREE on Request

N. COOPER & CO
NAPIER RD — POONA.

When answering our advertisers, please mention 'The Madras Agricultural Journal'.

Everything for the Farm and Dairy

Implements and Utensils
for all Purposes:

Ploughs	'Clock'
Reapers	Cream Separators
Ensilage Cutters	Butter Churns
Seed Grading and	Butter Workers
Dusting Machines	Milk Bottles 192
Tattooing Forceps	Milk Cans
Castrators	Dairy Equipment
Byre Fittings	of every Description
Etc.	Etc.

*Complete Dairy Schemes Prepared
and Plant Erected anywhere in India*

The Indian General Trading Co., Ltd.

[Sole Agents : Dairy Supply Co., London] **GOA STREET
BOMBAY**

When answering our advertisers, please mention 'The Madras Agricultural Journal'.

(2)

STANES.

THE LEADING FERTILIZER FIRM.

WE KNOW WHAT MANURES ARE
REQUIRED BY THE RYOT AND WE
SUPPLY THEM AT THE CHEAPEST
PRICES COMPATIBLE WITH VALUE.

STANES' X.L. ALL

PADDY, COCONUT, POTATOES, TOBACCO
AND CHILLIES MANURES ARE UNBEATABLE
FOR QUALITY, MECHANICAL CONDITION,
AND EFFICACY.

Buy the best

From:—

T. STANES & CO. LTD.,
FERTILIZER SPECIALISTS,
COIMBATORE.

When answering our advertisers, please mention 'The Madras Agricultural Journal'.

(3)

SURVEY OF INDIA MAPS FOR ALL PURPOSES

Maps are available from recent surveys, fully coloured, showing all the Planting Districts on scales 1" and $\frac{1}{2}$ " to a mile.

Also smaller scale maps:—4 miles to the inch and 16 miles to the inch. Unmounted or in book-form or for the wall.

MAPS AND PLANS REPRODUCED. ALL KINDS OF MAP-MOUNTING DONE.
SURVEYS OF ESTATES UNDERTAKEN. SPECIAL MAPS.

Bangalore and Surrounding Country	1" = 1m. ...	Rs. 2 0
Bangalore Guide Map	3" = 1m. ...	" 3 8
Seringapatam Guide Map	3" = 1m. ...	" 2 0
Ajanta, Ellora Cave Guide Maps		" 1 0 each.
Guide Map to Hampi Ruins		" 1 0
Guide Map to Pachmarhi	1" = 1m. ...	" 2 0
Railway Map of India		" 1 10
Road Map of India	1" = 50m. ...	" 1 4

Map Catalogue Rs. 1-8-0 including postage.

Apply to:—

THE DIRECTOR, SOUTHERN CIRCLE,
SURVEY OF INDIA, BANGALORE.
LAVELLE ROAD (Close to B. U. S. Club.)



FRESH VEGETABLE and FLOWER SEEDS ALWAYS IN STOCK
Ask for free catalogue with illustrations
PESTONJI P. POCHA & SONS, Post Box 55, Poona

When answering our advertisers, please mention 'The Madras Agricultural Journal'.



'NICIFOS'

(Ammonium Phosphate)

The Ideal Modern Compound Fertilizer for India

TWO GRADES:

- No. 1 'NICIFOS' 17/45 (17% Ammonia, 45% Phosphoric Acid)
 No. 2 'NICIFOS' 22/18 (22% Ammonia, 18% Phosphoric Acid)

'NICIFOS'

- | | |
|--|--|
| 1. Two plant foods in one. | 7. Easy and clean to handle, dry, white and crystalline. |
| 2. No useless carrier. | |
| 3. Saves freight, handling and application charges. | 8. Does not become moist or deteriorate in storage. |
| 4. No useless residue left in the soil. | |
| 5. Does not wash out of the soil; stays where you put it. | 9. No acid: cannot rot the bags. |
| 6. Better and more uniform than any mechanical mixture can be. | 10. Specially suitable for TEA. |

IMPERIAL CHEMICAL INDUSTRIES

(INDIA), LTD.

— Madras, Cochin and Calcut. —

When answering our advertisers, please mention 'The Madras Agricultural Journal'.

THE STANDARD FURNITURE Co., LTD.

KALLAI (S. MALABAR)

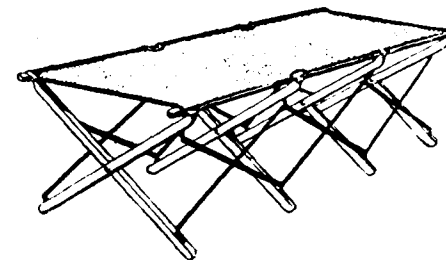
Largest Manufacturers of Camp Cots in India

OUR MOTTO:—Honest service and Moderate rates.
 Maximum strength and Minimum cost.

OUR AIM:—To reduce cost, with the aid of modern appliances and serve the public in a real Swadeshi spirit.

We specialize in the manufacture of camp cots and have patterns to suit all pockets

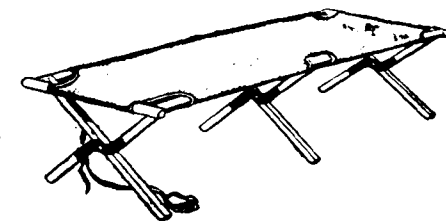
Pattern A
'Excellence'



Price
 Rs. 15 only
 Mosquito rods
 Re. 1
 Bag Rs. 1-8 only
 Cot with Water-
 proof canvas
 Rs. 2 extra

The letters of appreciation we receive from our growing customers, bear testimony to the appropriateness of the name of this pattern. The cot is 6' 3" long and 2' 4" wide.

Pattern B
'Challenge'



Price
 Rs. 13 only
 Mosquito rods
 Re. 1
 Bag Rs. 1-8 only

The Challenge implied in this pattern is that with the aid of mechanical advantages, India can compete with foreign countries. A Trial order will convince you that we have not exaggerated India's claims. The cot is 6' 3" long and 2' 4" wide.

Pattern C
'Marvel'



Price
 Rs. 6 only

"MARVEL"

Price Rs. 6 only

It is really a marvel that a folding canvas cot strong and durable is made available at this reduced rate. The cot is 6' long and 2' 4" wide and fitted with Jute Canvas.

SPECIAL DISCOUNTS TO STUDENTS

We undertake to make specially on order—

Canvas Cots 7 ft. long and 3 ft. wide at Rs. 25 each

When answering our advertisers, please mention 'The Madras Agricultural Journal'.

USE DILRANJAN



Best Indian Pain Balm, Superior
Balm in the Market, Magic cure
for all pains, Headache, Cold,
Sprains, Swellings, Neuralgia,
Rheumatism, Stiff joints etc.

Price, As. 8 per tin

DILRANJAN DEPOT

POST BOX 183, MADRAS

BEST PLANTS & FRESH SEEDS

READY FOR SALE

Best Season to Grow in all climates

	Rs.	A.
Salem Mango grafts, 3 years old, dozen ...	...	9 0
Guava, Pomegranates, and Figs, dozen ...	...	6 0
Pomaloe, Orange, Limes, etc., dozen ...	...	9 0
Roses and coloured Crotons, dozen ...	...	6 4
English Vegetable and Flower seeds, good varieties, 20 sample packets, each set ...	...	2 0
Do. do. 10 sample packets, each set ...	...	1 0
Indian Vegetable seeds, 20 packets ...	...	2 0

Other sorts of plants and seeds are ready now.

Illustrated Catalogue free

S. K. I. ABDUL RAHIMAN SAHIB

Salem Nursery Gardens.

Telegraphic Address 'NURSERY,' SALEM

SALEM

PLANTS FOR SALE

A revised catalogue of fruit-trees and ornamental plants for sale at the Government Gardens, the Nilgiris, is now available and will be sent on receipt of annas four.

Apply to:—CURATOR,

Government Botanical Gardens, Ootacamund.

WANTED.

Agents to enlist Subscribers for the 'Madras Agricultural Journal.' Liberal terms.

Apply:—MANAGER,

Madras Agricultural Journal, Coimbatore,
LAWLEY ROAD P.O.

When answering our advertisers, please mention 'The Madras Agricultural Journal'.

CONTENTS

ORIGINAL ARTICLES—

PAGE

I. Cost of Rearing Cattle. By T. Murari and M. P. Kunhikully ...	335
II. 'Northern' Cottons. By M. Satyanarayana ...	340
III. Bee-Keeping. By J. N. Jayakaran ...	346
IV. Studies in the Cost of Production of Crops—Paddy. By P. L. Narasimham ...	349
V. Koyyathotakura (Amaranthus Sp.) as Green Fodder. By G. Jogi Raju ...	350
VI. Early Agricultural Extension Work in U. S. A. By B. S. Rao ...	351

SELECTED ARTICLES—

1. Sugar-cane Research in India ...	356
2. Agriculture in Russia ...	358
3. The Goat ...	360
4. India's Worst Poultry Pest ...	362
AGRICULTURAL NOTES ...	364
FARMING CALENDAR ...	365
NOTES AND COMMENTS ...	366
GLEANINGS ...	370
CORRESPONDENCE—QUERIES AND ANSWERS ...	371
COLLEGE NEWS AND NOTES ...	375
AN APPEAL FOR SEEDS OF WILD SORGHUMS ...	378
THE RAMASASTRULU-MUNAGALA PRIZE—1931 ...	378
WEATHER REVIEW ...	379
DEPARTMENTAL NOTIFICATIONS ...	380
ERRATA ...	381
APPENDIX—Additions to the Library ...	382

The Madras Agricultural Students' Union

PATRONS

V. Arumugam Pillai, Sundaikamathur, Coimbatore District.
 Dewan Bahadur C. Arunachala Mudaliar, Zamindar of Chunampet, Chingleput District.
 Lodd Govindoss, Madras.
 Khan Bahadur Haji Abdulla Haji Kasim Sahib Bahadur, Udipt, S. Kanara District.
 A. M. Kalinga Rayar, Kumara Zamindar of Uttukuli, Coimbatore District.
 Raja Sree Krishnachandra Gajapati Narayana Deo Garu, Raja of Parlakimidi,
 Ganjam District.
 Raja Sri Madana Mohana Simha Deo Garu, Zamindar of Dharakota.
 V. Madhava Rajah, Kollengode, Malabar District.
 Rao Bahadur Sir A. P. Patro, Berhampore.
 Rao Bahadur T. A. Ramalingam Chettiar, Coimbatore.
 Sir C. P. Ramaswami Ayyar, Madras.
 Dewan Bahadur C. S. Rathnasabapathy Mudaliar, Coimbatore.
 M. Sambandam Mudaliar, Coimbatore.
 Veerarayan Thirumalpad, Nilambur, Malabar District.
 V. C. Vellingiri Gounder, Coimbatore.
 Venganad Raja Sir Vasudeva Rajah, Kollengode, Malabar District.
 C. V. Venkataramana Ayyangar, Coimbatore.
 R. Jeevandas, Varanasi, Parlakimidi.

The Madras Agricultural Students' Union

OFFICE-BEARERS FOR 1930-31

The Council (15)	Managing Committee (9)
1. C. Tadulingam, President (<i>Ex-officio</i>).	1. President.
2. Rao Bahadur T. S. Venkataraman, <i>Resident Vice-President</i> .	2. Resident Vice-President.
3. Rao Bahadur D. Ananda Rao, <i>Moffusil Vice-President</i> .	3. Secretary.
4. K. T. Alwa.	4. Editor.
5. C. Ramaswami.	5. M. R. Balakrishnan, <i>Manager</i> .
6. K. M. Thomas, <i>Secretary</i> .	6. M. Rajagopal Ayyar, <i>Treasurer</i> .
7. Rao Bahadur B. Viswa Nath, <i>Editor</i> .	7. K. Krishnamurthi Rao.
8. G. N. Rangaswami Ayyangar.	8. M. A. Sankara Ayyar.
9. V. Muttuswami Ayyar.	9. S. Krishnamoorthy Rao, <i>Student, Class II</i> .
10. M. C. Cherian.	Editorial Board (7)
11. Rao Bahadur J. Chelvaranga Raju.	1. Editor.
12. G. Jogi Raju.	2. Secretary.
13. U. Vittal Rao.	3. Manager.
14. K. T. Bhandari.	4. K. Ramiah.
15. A. S. Swaminathan, <i>Student, Class II</i> .	5. S. V. Duraiswami Ayyar.
	6. C. S. Krishnaswami.
	7. (Vacant) <i>Student</i> .

Farming will never be a success unless the farmer
 had more voice in the disposal of
 his produce.—P. Morrel.

The Madras Agricultural Journal

(ORGAN OF THE M. A. S. UNION)

Vol. XIX]

AUGUST 1931

[No. 8

COST OF REARING CATTLE

BY T. MURARI, B.SC. (OXON), F.L.S.,

Offg. Deputy Director of Agriculture, Live Stock

AND

M. P. KUNHIKUTTY, L.A.G.,

Agricultural Demonstrator, Live Stock.

The ryot in India like his brothers in the rest of the world has always been an experimenter. While in the temperate climates the farmer has to work under severe winter conditions, the ryot here has equally great or perhaps greater difficulties to face during the hot summer and drought periods. All his work is one long experiment; the weather conditions should be favourable, his ploughings and general cultivation and manuring should be complete in time for sowing, and when he has sown, he is at the mercy of the weather. The severity of the test may be considerably lessened in those parts of the country where water-supply is abundant.

Having once grown his crop, he is then faced with the problem of marketing. He is generally indebted to the village money-lender who demands payment when the ryot is not able to dispose of his produce with advantage. If he had facilities with regard to loan from co-operative societies he is temporarily saved and can store his produce until such time as when he can realize the price he wants. Under the present general economic depression, however, even this prospect is lost to him.

Under these conditions he is faced with a problem of which he is the best judge and he alone can solve it. To begin with, he has to decide if he should grow the crop he has hitherto grown. If he does not wish to, can he grow another which would suit his conditions, and pay? In places where only one kind of crop, like rice, can be grown, it may not always be possible to work out a suitable rotation. When such is the case, what is he to do? When there is surplus of food-stuffs and there is no prospect of selling them at a profit in the near future the only thing to do is to feed them to cattle and convert the products into animal products and a useful manure. In other words, give more attention to animal husbandry.

In the best method of animal husbandry, as much home-grown food-stuff as possible is used for ration, and the farmer who does this at a low cost will realize the highest profits. It is very doubtful if the average ryot knows accurately the cost of growing the various crops and which really show profit. With cattle breeding, the ryot will be in greater ignorance as to the cost of rearing cattle. The purpose of this communication is to put forward what it actually costs to rear either a bull or a heifer until the animal is mature. Cost of rearing is worked out for the Kangayam, Scindhe and the Ongole, and the figures apply to conditions at Hosur. The animals get the best attention in every way, and the cost of labour is not high. If the ryot can produce well-bred animals at a cost lower than that at Hosur and show profit in his transaction, he may congratulate himself.

The rearing period of the animal is divided into three stages: Suckling, Yearling and Heifer or Young Bull. Suckling state is dependent on the lactation of the dams. Taking the average length of lactation, it is noted that there are marked differences in the breeds varying from 6 to 11 months. The next stage extends for a year, and in the third period there is variation depending on breeds. The maturity of the animal is arrived at by noting when the heifers first come to heat, or, in the case of bulls, when they begin to serve. In order to compare the cost of rearing for different breeds for a given period, cost of rearing has also been worked out for 2½ years in each breed.

TABLE I

Cost of rearing an animal to maturity

Breed	Heifer		Bull	
	Age at maturity	Cost	Age at maturity	Cost
		RS		RS
Kangayam ...	2½ years ...	210	2 years 8 months ...	290
Scindhe ...	2 years 4 months ...	270	2 years 11 months ...	375
Ongole ...	2½ years ...	300	3 years ...	385

TABLE II

Cost of rearing to a uniform age of 2½ years

Breed	Heifer	Bull
	RS	RS
Kangayam ...	210	280
Scindhe ...	280	320
Ongole ...	300	330

A table detailing items of expenditure in rearing is shown below:—

TABLE III

Cost of rearing a heifer and a bull up to 2½ years

Ongoles and Scindhes

Items of expenditure	Ongoles				Scindhes			
	Suckling stage, 9 months	Weaned stage, one year	Heifer, 9 months	Bull, 9 months	Suckling stage, 7½ months	Weaned stage, one year	Heifer, 10½ months	Bull, 10½ months
	RS A	RS A	RS A	RS A	RS A	RS A	RS A	RS A
Milk ...	147 0	...	...	...	129 0	...	...	...
Concentrates and bulky food ...	23 6	40 0	28 2	56 4	19 4	40 0	32 13	65 10
Grazing ...	2 12	13 8	20 4	20 4	2 4	13 8	23 10	23 10
Attendance ...	1 14	3 0	3 12	7 2	1 9	3 0	4 6	8 5
Housing ...	1 5	2 8	2 7	3 0	1 1	2 8	2 13	3 8
Veterinary charges ...	0 12	1 0	0 12	0 12	0 10	1 0	0 14	0 14
Sundries ...	1 8	2 0	1 14	2 4	1 0	2 0	2 3	2 10
Total ...	178 9	62 0	57 3	89 10	154 12	62 0	66 11	104 9
			297 12	330 3			283 7	321 5

TABLE IV

Cost of rearing a heifer and a bull up to maturity—Ongoles and Scindhes

Items of charges	Ongoles				Scindhes			
	Suckling stage, 9 months	Weaned stage, one year	Heifer, 9 months. Up to maturity (2½ years)	Bull, 1 year and 3 months. Up to maturity (3 years)	Suckling stage, 7½ months	Weaned stage, one year	Heifer, 8½ months. Up to maturity (2 years and 4 months)	Bull, 1 year and 8½ months. Up to maturity (2 years and 11 months)
	RS A	RS A	RS A	RS A	RS A	RS A	RS A	RS A
Milk ...				...			...	...
Concentrates and bulky food ...	Same as above				Same as above			
Grazing ...								
Attendance ...								
Housing ...								
Veterinary charges ...								
Sundries ...								
Total ...	178 9	62 0	57 3	144 2	154 12	62 0	54 4	156 9
			297 12	384 11			271 0	373 5

TABLE V

Cost of rearing a Kangayam Heifer and Bull up to 2½ years

Items of charges	Kangayams			
	Suckling stage, 6½ months	Weaned stage, one year	Heifer, 11½ months	Bull, 11½ months
	RS A	RS A	RS A	RS A
Milk ...	109 0	...	...	...
Concentrates and bulky food ...	14 14	14 0	12 0	71 14
Grazing ...	2 0	13 8	25 14	25 14
Attendance ...	1 4	3 0	4 9	9 0
Housing ...	0 15	2 8	2 7	3 11
Veterinary charges ...	0 10	1 0	0 15	0 15
Sundries ...	1 0	2 0	2 7	2 14
Total ...	129 11	36 0	48 4	114 4
			213 15	279 15

TABLE VI

Cost of rearing a Kangayam Heifer and Bull up to maturity

Items of charges	Kangayams							
	Suckling, 6½ months		Weaned, one year		Heifer, 11½ months. Up to maturity (2½ years)		Bull, 1 year & 1½ months. Up to maturity (2 yrs. 8 mths.)	
	RS	A	RS	A	RS	A	RS	A
Milk ...								
Concentrates and bulky fodder ...							75	0
Grazing ...							30	0
Attendance ...							10	12
Housing ...							4	8
Veterinary charges ...							1	2
Sundries ...							3	6
Total ...	129	11	36	0	48	4	290	7
					213	15	290	7

Details of calculation.

Milk fed to a calf is taken as an average of 6 lb. per day and the cost at 1½ annas a lb. This item has been found the costliest of all.

2. The cost of concentrates and bulky food is the actual extracted from the Cattlefood statement, but fodders have been valued at their cost of production.

3. Grazing charges have been fixed by noting the quantity of grass consumed by an adult animal per year from the register maintained for the purpose and by calculating the value thereon. For a suckling calf and an yearling, ¼ and ½ the rate, respectively, of an adult has been considered adequate.

4. Attendance charges are the actuals worked out from the coolies' muster.

5. Housing is an item the cost of which cannot be easily arrived at. Stables designed for Military horses, have provided accommodation for cattle and the cost, if worked out, would be an exaggerated figure. To get an equitable rate, calculation has been based on plinth area occupied by an animal and the cost worked out at Re. 1 per sq. foot. The interest on capital is charged at 5 per cent and the depreciation at 2½ per cent.

6. The Veterinary charges are the actual cost of medicine used and coolies engaged in the hospital. The cost works out to Re. 1 per animal per annum.

7. Under Sundries a rough figure, Rs. 2 to 3 per animal per year, has been put. This item consists of the cost of buckets, feed troughs, chains, ropes and miscellaneous articles, leave wages to attendants, extra charges in inoculating animals, etc.

From the statement it will be noticed that:—

(i) The heifers mature earlier than bulls. Kangayams and Ongoles heifers mature at 2½ years while Scindhes take a slightly shorter period.

(ii) Kangayams cost least and the Ongoles most.

(iii) The cost of milk fed to calves forms the heaviest item of expenditure.

From our observations it is clear that the average ryot does not keep accounts systematically and is not sure whether or not his industry really pays. He mainly goes by the market prices and is unable to say if the cost of production is really low enough to make the commodity he sells, pay. If he maintains costings there is little doubt that he will soon realize which department in his industry is paying. So far as cattle breeding is concerned he will find out that animals graded by pure bulls would fetch a better price than those bred by the 'scrub' bull. He will also find out that there are many items of expenditure like grazing, doctoring, depreciation of animals, etc., which he has not included in the cost of rearing animals. When he works out the cost of rearing animals on the lines detailed above, he will soon find out if his method of rearing pays.

'NORTHERNS' COTTONS

1.—THEIR HISTORY AND PRESENT POSITION

* By M. SATYANARAYANA, B.A., B.Sc. AG.

Assistant lecturer in Agriculture, Agricultural College, Coimbatore.

A. *Topography of the tract and the habitat of types.*—Circumvented by the Veligondi Hills—that part of the Eastern Ghats bordering Nellore and the two inland districts of Cuddapah and Kurnool—by the Uppalapad Plateau which is an outspur of the Mysore Tableland in the south-west of the Kurnool District, by several bosses west of the Handri valley in the Pattikonda Taluq, by Tungabhadra in the north till Sangameswaram and the Kistna in continuation after the confluence, lies the 'Northerns' Cottons Tract, rich in long stapled cotton, amongst the indigenous types of the Peninsula. It comprises chiefly Kurnool District excepting a portion of the Pattikonda Taluq, Cuddapah District, and a portion of Anantapur. Nandyal, Kurnool, Proddatur and Tadpatri are the important centres of the tract. According to the Report of the Indian Cotton Committee, 1919, the estimate of area and output of 'Northerns' is 439,000 acres and 65,000 bales (each of 400 lb. of lint) respectively. But groundnut, in its expansion, taking a portion of the extent under cotton and the prohibition of rail-borne cotton from beyond Tarlupadu (on the Guntakal-Bezawada line of the

M.S.M. Ry.) into the tract under the Cotton Transport Act of 1925 have reduced the acreage and output. With 50 lb. of lint as acre-yield (official average for the districts concerned), or at 8 acres for a bale of 400 lb. lint (and allowing a margin for the quantity utilized in hand-spinning), the general output of the three markets of the tract has been for

	Bales
Nandyal	20,000
Kurnool	8,000
Tadpatri	12,000
Total	40,000

This represents the produce from an area of 320,000 acres as detailed below for the three districts.

	Acres
Kurnool with the exception of Pattikonda Taluq	200,000
Cuddapah	57,000
Anantapur (one-third of the total cotton area of the district)	63,000
Total	320,000

The hill ranges running more or less parallel from north to south have divided the tract into three distinct valleys between them:—(1) the Gundlakamma or the Cumbum valley between the Veligondis and the Nallamalais, (2) the Kundeir or the Nandyal valley between the Nallamalais and the Yerramalais and (3) the Handri valley beyond the Yerramalais in the west.

The great heights of the Nallamalais and the Yerramalais, on either side of the inner Nandyal valley, causing a larger precipitation of the South-west and the North-east Monsoons are responsible for a heavier rainfall in the inner valley than in either of the extra-situated valleys.

	Average rainfall in inches
Nandyal valley	29.91
Cumbum	24.91
Handri	24.78

The types with distinct habitats are quite in keeping with the rainfall and the soils of the particular valleys. The retentive black soils and the alluvial washes of the Kundeir basin transported from the Yerramalais and the Nallamalais and deposited on the original shales, or shaly argillaceous limestones, along with the heavier rainfall, produce cottons markedly superior in yield, ginning percentage, staple, colour and other qualities to the Red Northern raised with a relatively lower rainfall in the outer valleys, on 'tuvva' (fine dusty) and 'baraka' (gravelly) soils.

	Yield in lb.		Ginning	Staple	Colour
	Lint	Kappas	percentage	length	
White Northerns ...	80	275	27-28	$\frac{1}{2}$ " to 1"	White.
Red Northerns ...	40	160	24-25	$\frac{1}{2}$ " to $\frac{3}{4}$ "	Brown to red.

The Red Northerns, with the hardy habit acquired through their growth under Nature's inhospitable and uncongenial conditions, present produce of a stronger staple than the 'whites'.

Cottons east of the Nallamalais and belonging to the Gundlakamma of Cumbum valley go by the trade name of 'Red Northerns—Tarlupadu or Markapur Red'; those west of the Yerramalais and in the Handri valley go by 'Red Northerns—Veldurty or Kurnool Red'; and those of the Nandyal valley as 'White Northerns'.

It may, however, be noted here that to a small extent, the black soil in the Veldurty or Kurnool region does produce white cotton as well; and the red soils in the Nandyal valley, Red Northerns also.

B. Seed admixture and heterogeneity in population through a large number of types.—'Tella-patti', White Northerns and 'Yerra-patti', Red Northerns, were the two chief types (*G. herbaceum* and *G. Indicum* respectively) prior to the installation of the power-driven roller-gins. While the hand-gin was the only contrivance for the separation of seed and lint, all seed for sowing used to be of the crops grown *in situ* in the tract. Types never changed till twenty-five years back. With the speedy disposal of kappas by the power-driven roller-gins, produce from various localities began to get dumped at the ginneries. This and the rapid transport by rail are largely responsible for the intermingling of types.

Seed admixture has been caused in the following ways:—(1) Natural crossing, (2) The village merchants' system of binding over the ryots, (3) Trading with unfair ends and (4) Import of types foreign to the tract.

(1) Natural Crossing.

'If crossing to the extent of ten per cent per annum were unaccompanied by segregation, we should find the number of vicinists increasing along a logarithmic curve, since some of the crossed strains will be re-crossed in subsequent years.'—Dr. Lawrence Balls. The aim of dealers in a market is to secure 'even running cotton', to use an American phrase. When under environmental influences of season, soil and climate (greater stress being laid on rainfall in climate), the same strain yields produce widely differing in spinning qualities, the harm caused by natural crossing, in the same species need cause no alarm. Fears caused on this account may therefore be dispelled as seen from the following extract from Dr. Balls.

'Some part of the F-1 pollen from an interspecific cross is prepotent over all other pollen; that self-pollen is prepotent over pollen from other species; and that pollen from other species only makes its way to the ovule with difficulty.'

Practically, renewal of seed supplies may be effected when there is a pure source as in the case of the Department for the strains.

(2) The village merchants' system of binding over the ryots.

In the tract, giving 5 'dadiams' (or 33 lb.) of seed for sowing purposes and taking in return one maund (26½ lb.) of seed-cotton at picking time is the rule. All the petty merchants who feed the dealers of firms, carry on their trade with ryots of mediocre or poor status in this way (*jatti* system, as it is called). The merchant is a great obstacle to carry out any reform, as the *jatties* and other prior debts contracted by

the ryot for cultivation expenses, always keep the latter a slave to the former. The petty merchant purchases cotton from a legion of such clients, from coolies that receive their picking wage in kind and from various other sources. The seed after ginning such stock goes into lots intended for distribution for sowing purposes.

(3) Trading with unfair ends.

Intermingling of types has been brought about in a large measure through the medium of the merchant-buyers who purchase the produce as kappas from the cultivators and deliver to the Firms as lint. The *Vaisya* merchant is largely competed by the *Lingayat* and the cultivating *Reddi*. Cultivating ryots of the Reddi community with huge-landed areas—generally the principal or biggest ryots in the village, are figuring prominently in the cotton trade. They are the main buyers of produce and the suppliers of seed for sowing in their own and adjoining villages. Some of them possess their own ginneries or hold shares in ginneries built under Joint Stock Companies; others are, still further, feeders to brokers, or firm-brokers themselves. It may be imagined how such a connecting chain along with the *jatti* system would keep the cotton culture controlled by the cotton trade.

Though mention is made in the contracts, by the sellers to Firms, as delivery by type (e.g., White Northerns, Tarlupadu Red, etc.), yet the delivery practically is more according to the sample of definite 'class' (staple, colour and refraction or mechanical impurities), brought about by a skilled admixture of kappas of several types before the ginning.

Profits are realized by mixing inferior cottons with the locals and passing the same as genuine cotton. To deliver Good White Northerns under a contract, a merchant purchases kappas of white, Red and Cambodia in the proportion of 7 : 2 : 1; or, White, Mungari and Cambodia in 8 : 1 : 1. The kappas for mixing are put in layer by layer. Red Northerns give the additional strength needed in the mixture and Cambodia the whiteness. The resulting seed of the mixture when disposed of for sowings brings in the heterogeneous population. Mixtures in other proportions and with other varieties are also practised when the agent of the firm and the seller resort to underhand dealings.

Prior to the enforcement of the Cotton Transport Act of 1925, extra-tractial produce for illegal trade profits used to be largely imported. A large quantity of the cheap inferior Cocanadas from Guntur side used to be got for wilful admixture with the local cotton for delivery under 'Northerns'. So vigorous was the import into Nandyal of this exotic stuff, that since its prohibition under the Act, the output of the Nandyal Market has gone down by nearly 50 per cent. Since 1926, the presence of the *G. obtusifolium* (Cocanadas) plants in the White Northerns' fields is greatly minimised. Kappas however are now got under license from Tarlupadu.

(4) Import of the types foreign to the tract.

Under this head special mention may be made of (a) 'Coomptahs' and (b) the *Neglectum* types.

With the merchant's interest in securing as high a percentage of lint as possible from the kappas he purchases and the ryot's ambition to procure as high a yield as he can under the dry-farming conditions, experiments were ever going on with trial of the exotic types: And whether or not these objects were to be achieved without sacrificing the qualities desired for spinning, was not the main consideration.

The original 'White Northerns' of the tract had black, non-fuzzy, naked seed and the type was giving only a ginning percentage of 25. One of those that gained ground in the Nandyal valley is what is popularly known as 'Gadag' seed. It is cotton seed (*G. herbaceum*) imported from the Coomptah tract from the Districts of Bijapur, Dharwar and Gadag of Bombay Presidency. Gadag, Mallapur, Annigeri, Bagalkot, Alur, Bijapur, Hubli and Kopbal are the chief centres from which the seed is exported by rail from the said districts. Nandyal and Panyam obtain the largest supplies (over 20,000 bags of 130 lb. each in 1929-30), Kurnool and Tadpatri figuring next to them. From Nandyal, seed is taken to Sirvel and Nandyal Taluqs, Atmakur Sub-division of Nandikotkur Taluq and portion of Koilkuntla Taluq. From Panyam, the seed goes to Banganapalle State and Nandyal Taluq. From Tadpatri, to Owk sub-division of Koilkuntla Taluq: and from Kurnool to portions of Kurnool and Nandikotkur Taluqs. Thus stocks continue to be largely imported into the Nandyal tract for nearly a score of years. With a higher ginning percentage of 27 to 28 and a better drought-resistant quality than the original 'White Northerns', this 'Gadag' had ousted the former to the verge of extinction. The original 'White Northerns' of black, non-fuzzy seed now figure only as stray seeds in other types: and the present 'White Northerns' are mainly acclimatised 'Coomptahs'.

As far back as 1917, the Indian Cotton Committee observed the spread of *G. neglectum-roseum* around Adoni. It gradually spread into Pattikonda Taluq, to parts of Kurnool and Dronachellam Taluqs and to stray places in Nandyal Taluq. It suits the 'Mungafi' or early crop season, is a good yielder (500 lb. seed cotton), has a high ginning percentage (30 to 33), but possesses a weak and short staple ($\frac{1}{2}$ "). In the markets of the tract, it is not delivered by itself on contracts, for want of demand. It mainly goes in as an adulterant in Red Northerns and to a small extent in White Northerns. This type is also known as 'Gospatti' (*G. neglectum-roseum* and *G. neglectum-verum*). Its spread is restricted on account of the poor price it fetches, when compared to others. A waggon-load of seed is reported to have been got to Kurnool from Akola this year.

C. Past and Present Types.—

TABLE I
Past Types

Trade name	Local name	Botanical species	Remarks
Red Northerns ...	<i>Yerra-patti</i>	<i>G. Indicum</i>	...
White Northerns ...	<i>Tella-patti</i>	<i>G. herbaceum</i>	Non-fuzzy, black seed.

TABLE II
Present Types

Present types of the tract	Chief constituent and adulterants	Local name	Botanical species	Trade type	Average approximate percentage based on observation	
					Prior to C. T. Act of 1925	Present day
RED NORTHERNS ...	Chief constituent Adulterants figuring as rogues.	<i>Yerra-patti</i> , <i>Masara-patti</i> or <i>Guntur-patti</i> <i>Gospatti</i> , Do.	<i>G. Indicum</i> , <i>G. obtusifolium</i> , Do. <i>G. neglectum-roseum</i> <i>G. neglectum-verum</i>	Red Northerns, 'Cocanadas-Red' (Guntur), Do, 'White' (Warangal) 'Mungari'.	60	90
					29	5
					1	...
					10	5
					100	100
WHITE NORTHERNS.	Chief constituent. Adulterants figuring as rogues.	<i>Gadag-patti</i> , <i>Tella-patti</i> , <i>Masara-patti</i> or <i>Guntur-patti</i> <i>Gospatti</i> , Do. <i>Jawari</i> , <i>Sircar No. 2</i> , <i>Sircar No. 14</i> , <i>Pedda patti</i>	<i>G. herbaceum</i> , Do, <i>G. obtusifolium</i> , Do, <i>G. neglectum-roseum</i> <i>G. neglectum-verum</i> , <i>G. herbaceum</i> , Do, <i>G. Indicum</i> , <i>G. hirsutum</i> , Do.	'Coomptah', Original Nandyal white, 'Cocanadas-Red' (Guntur), Do, 'White' (Warangal) 'Mungari', 'Westerns' (Bellary), 'Agriculture', 'Farm', Cambodia, Dharwar-American. ²	70	90
					3	1
					14	1
					trace	...
					5	4
					3	1
					2	trace
					1	2
					1	...
					1	1
					100	100

¹ When freshly imported, but not acclimatised, Gadag seed is sown, the proportion is 99 Coomptah and 1 Dharwar-American.
² Green Dharwar-American seeds are always found in imported bags of Gadag seed.

BEE-KEEPING

By J. N. JAYAKARAN

Chief Secretary, Y.M.C.A. Rural Reconstruction Centre,
Ramanathapuram, Coimbatore

The scope of this note is limited. Its object is only to introduce the reader to the possibilities of bee-keeping in India and will not, therefore, include what a hand-book on the subject may be expected to contain. Bee-keeping has several advantages over other similar occupations, such as poultry-keeping, gardening, fruit-raising, etc., and in fact is very much easier and almost inexpensive; but yet, the subject is so vast that all about bee-keeping cannot be dealt with in a short note such as this.

In the western countries bee-keeping is pursued not only as a hobby but also as a money-making business. The introduction of modern bee-keeping in the year 1852 marks the commencement of the new era in this industry. Tons of honey are produced every year for local consumption as well as export. Scientific research and practical work among bees have advanced so much in these days that this new industry is being taken up by increasing numbers of people with profit to themselves. Apiaries with several thousands of hives are very common in Europe and America.

Bee-keeping in India is still in the primitive stage. It is under the bright rays of the sun that flowers can secrete that sweet fluid known as *nectar*, which bees gather and elaborate into honey. Ours, being a hot country, can afford to provide more work for bees almost throughout the year than the countries of the west. It is interesting to note that the giant bee of the world (*Apis dorsata*) which gathers the largest quantity of honey is a native of India known as the Indian Rock Bee. From the single comb which it builds in the open air plenty of honey is gathered, 50 to 60 pounds being a very modest estimate. Unfortunately, this type of bee has so far thwarted all human efforts at domesticating it. Introduced into the wilds of Europe over and over again, it successively proved a failure in those regions. The moment any disturbance is caused to a colony of these bees, they chase the intruder several miles to avenge themselves. One or two stings are unbearably painful and many of them fatal. Even if the man dives under water and hides himself no safety is ensured. The bees hover over the surface of the water to victimise him the moment he sticks out his head to breathe. The writer once witnessed the sight of a man chased by a number of these bees. As he ran to dive into the waters of an adjacent river, he picked up a piece of wood and with it plunged into the water. The wood was let go floating on the surface of the water. It moved slowly with the current down the river. The bees mistook it for the man and in numbers attacked and stung it, as it went along. The man under water came out and went home with a hearty laugh.

There are three other kinds of bees in India, whose habits make them cluster and live in colonies. They are the Indian Bee, the Little Bee and the Dammer Bee. The little Bee, like the Rock Bee, is not domesticable,

nor does it give much honey. The Dammer Bee, though domesticable, does not gather honey in any appreciable quantity to justify its being kept for that purpose.

The Indian Bee (*Apis indica*) is the only variety of the honey bees in India, which it is possible to domesticate for honey production. This bee responds well to gentle treatment and seldom stings. The sting is not after all painful. A number of stings received over a short period of time soon makes the human body immune to the poison, so that any more stings cause little pain. In the Y.M.C.A. Rural Centre Apiary it has been possible to extract as much as twenty pounds of honey from every hive in a year. This means Rs. 25 from each hive per annum at Rs. 1-4 a pound. Incidentally, to show what demand there is for pure honey in these parts, it may be said that after the honey flow stops in the end of August, several orders for honey are received and registered with advance payments for early execution in the next honey season.

The Indian Bee can be found to live in colonies almost anywhere. Even in the most unlikely places they are found to thrive. All they want is a dark cavity—in tree, wall, or hedge—to protect their combs from sun, rain and wind, so that brood rearing and honey collection may be safely done, and a pasturage for collection of floral nectar within a radius of 2 or 3 miles from their combs. The population of every colony is made up of one single mother bee, known as the Queen Bee, several hundreds or thousands of what are known as the Worker Bees and (in certain seasons) a few male bees called Drones. They can be easily distinguished by their different sizes and colours. The queen is by far the largest member of the colony, beautiful with golden legs, short wings and copper-coloured abdomen. She is the only fully developed female bee in the colony and therefore she alone can lay eggs for hatching out more bees; the workers are the smallest members with a few dark and brown lines alternating across their backs, active and busy all the time; they are really females, but their sex is undeveloped. The drones are of medium size, thick and black. Lazy in nature and not designed for any work except for the perpetuation of their species, the drones contribute no labour to the economy of a bee colony. For this reason the worker bees kill and throw them out when no longer required in the colony.

The process of hiving a natural colony of these bees is very simple. The bees gathering their combs are gently blown aside with a short bamboo or rubber tube and the combs taken out one by one and tied with any kind of fibre to the frames in the hive. When all the combs have thus been transferred, the hive with combs is gently taken to the place where the bees blown aside still cluster. The smell of their own combs will attract them into the box. They will at once walk in. If they are slow to enter, they can be jerked, or with a soft feather brushed down into the hive. After they have occupied the combs in the box, the hive is located wherever the bee-keeper desires. It is always best to place the hive under shade with its entrance hole towards the east so that the morning sun may direct its rays to the entrance holes to induce the bees to start work early every day. The new colony thus hived will commence work at once, attaching the combs to the frames, clearing the house and throwing out all bits of dust and debris and thus settling down to normal life. Ordinarily, nothing more need be

done for them. They will go on rearing brood and storing honey in the proper seasons. For very good results, however, the bee-keeper has to give some attention to them with a view to helping them in their work. Examination of combs, exclusion of enemies like the lizard, the spider, the ants, the wax-moth, etc., from the hive, prevention of swarming, re-queening increase of colonies, uniting and dividing them—are some of the most important factors in successful bee-keeping.

Honey need not be squeezed out of the combs. The Centrifugal Honey Extractor, which is easy to make, can be used for taking out honey without destroying the combs, which, when emptied, are returned to the hive for being used again by the bees for storing honey. This is a great help to them as well as to the bee-keeper, for frequent comb-building is hard work to the bees, which do it at the expense of the honey which will be lost to the bee-keeper.

In the case of combless colonies, say a newly captured swarm, the provision of artificial comb foundations, which can be made of pure bees-wax for a nominal making charge of 8 annas a pound will be a great help to the bees and their owner, as the bees quickly draw out the wax of the foundations and finish them into combs fit for their brood rearing and stores. It is reckoned that if the bees were left to produce their own wax for comb-building they have to eat five pounds to seven pounds of honey to produce one pound of wax. The advantage, then, of using the artificial comb foundations is clear.

The hive and frames may be made of any cheap wood and do not cost more than five rupees. If properly protected from the sun and rain, the hive ought to last a life-time. The bees will repay the investment more than five or six times within the first year, if conditions are not below normal. Apart from such appliances as have already been mentioned in this note, no other need be employed in this country where the climate is all in our favour.

Pieces of unserviceable combs and cappings may be easily converted into wax and rendered into foundation, or, if obtained in large quantities, sold. Wax is used in several industries such as polishing and varnishing wood, electro-typing, the manufacture of boot polishes, harness oil and lubricants. Some churches prefer to use bees-wax candles to any other.

As was said at the very commencement, this note has been written with the single object of creating some interest in the art of bee-keeping. To know all about the art, however, the reader will do well to read some very good books on the subject. To begin with, *Bee-keeping* by C. C. Ghosh, published by the Imperial Agricultural Institute, Pusa, Bihar, as its Entomological Bulletin No. 46, should be studied. It is about the best book for bee-keepers in India. Anybody desiring to undergo practical training in any apiary may apply to the Secretary, Y.M.C.A., Rural Reconstruction Centre, Ramanathapuram, Coimbatore.

STUDIES IN THE COST OF PRODUCTION OF CROPS

Paddy.

By P. L. NARASIMHAM,

Agricultural Demonstrator, Narasapatam.

Village :—Kondalagraharam. *Name of ryot* :—Gavireddi Tatayya.

Taluk :—Golugonda. *Area* :—3.00 acres.

District :—Vizagapatam. *Year* :—1930-31.

The soil on which the crop was cultivated is a light reddish loam, which permits of dry ploughing. Hence the ryot cultivates Ragi or Ooda in the *punasa* season (May to August), paddy in the main crop season (August-December), and gingelly, ragi, or onions in the *paira* season (January to April). Sugarcane is rotated with the above crops once in three or four years.

The land is supplied with water from the Varaha river through permanent channels, and there is also a good well to supply water to the garden crops in summer.

Most of the field operations are generally pushed through without the assistance of hired labour, except in the busy seasons of transplantation and harvest. The wages then paid to a man are As. 4/- and to a woman As. 2/- a day. The hire for a pair of cattle was As. 8/- per day.

Season.	Name of operation.	Men.	Women.	Cattle (pairs).	Estimated amount.	Actuals paid.	Remarks.
1930	Seedbed (30 cents)—				Rs. A. P.	Rs. A. P.	
Apl.-June	Ploughing six times ...	6	...	6	4 8 0	...	Own labour.
May	Cost of 3 cartloads of manure ...	...	...	...	3 0 0	...	Own.
	Carting, spreading, etc. ...	1	1	1	0 14 0	...	Own labour.
	Cost of seed 60 <i>kunchams</i> (300 lbs.) @ 4 <i>kunchams</i> per rupee ...	...	...	...	15 0 0	0 15 0	Purchased.
June	Sowing and covering seed ...	2	...	2	1 8 0	...	Own labour.
July-August	Lifting seedlings ...	12	...	...	3 0 0	1 8 0	6 men engaged.
	Total ...	21	1	9	27 14 0	16 8 0	

Season.	Name of operation.	Men.	Women.	Cattle (pairs).	Estimated amount.	Actuals paid.	Remarks.
July-August	Transplanted area (3.00 acres)—				Rs. A. P.	Rs. A. P.	
	Puddling three times and levelling ...	27	...	27	20 4 0	...	...
August	Trimming bunds, etc....	6	...	...	1 8 0	1 8 0	Hired labour.
"	Transplantation ...	...	60	...	7 8 0	6 6 0	51 women engaged.
September	Weeding ...	12	...	9	4 2 0	...	Own labour.
December	Harvesting ...	8	40	...	7 0 0	4 4 0	Labour partly engaged.
December	Stacking ...	5	3	...	1 10 0	...	...
1931 January	Threshing, winnowing, etc....	24	9	18	13 14 0	2 4 0	Labour partly engaged. Cattle pairs at As. 6 per pair for threshing and As. 8 for ploughing.
	Grand total ...	103	113	63	83 12 0	30 14 0	
Cost per acre ...					Estimate	Actuals	
Add land-tax Rs. 15/- per acre ...					27 14 8	10 4 8	
Total ...					15 0 0	15 0 0	
Yields 36 bags of paddy (164 lbs. each) at Rs. 4-8-0 per bag...					42 14 8	25 4 8	
6 carts of straw at Rs. 4/- per cart ...					162 0 0	162 0 0	
Total ...					24 0 0	24 0 0	
Value of yield per acre ...					186 0 0	186 0 0	
Net profit per acre ...					62 0 0	62 0 0	
					19 1 4	36 11 4	

KOYYATHOTAKURA (AMARANTHUS SP.) AS GREEN FODDER

By G. JOGI RAJU, DIP. AGRI.

District Agricultural Officer, Vizagapatam

This species of *Amaranthus* is cultivated in many places on a small scale for human consumption. But it is noteworthy that in some villages of the Vizagapatam District, it is raised solely as a fodder crop. A short account of its cultivation at Denkada may interest readers of this journal.

2. Rich high level garden lands are selected for this crop. *Pati* soil is also admirably suited to this. The crop is often raised year after year in the same plot, occupying it from January to August-September. Sometimes it is alternated with other garden crops or ragi nurseries. The land is ploughed well and does not generally receive any manure, as, being near the village, it gets enriched by night soil and pig droppings; but if

necessary some *penta* is also applied. It is then laid out into plots about 5 ft. square, with necessary irrigation channels. One Chittak of seed (10 tolas) is sown in 20 such beds and each bed supplies fodder for one pair of cattle every day. The seed is obtained from 'Gavaras' at Vizianagaram at a cost of two to four annas. The first cutting is commenced in about a fortnight after sowing, and thereafter one bed is cut every day, so that each gives a cutting once in twenty days in rotation. When at its best, each bed yields about ten pounds of green fodder at each cutting and about six pounds on an average. The crop is irrigated at intervals of about 5 to 10 days throughout the dry and hot season and goes on giving fair cuttings till the South-west monsoon precipitates heavy rain, which it cannot stand, and therefore dies out gradually by about August-September.

3. This fodder is considered best for working buffaloes; working bullocks are also fed with it. But milch cattle are never fed with it, as it is believed to heat the system and reduce the yield of milk. As human food also it is well known to heat the system. Goats and sheep also eat the fodder but rarely get it.

4. It may be worthwhile analysing this fodder and finding its merits as a fodder crop. It will be seen that, calculated from the yields of the small areas on which it is usually raised, the outturn runs up about 50 tons per acre during the eight months of its growth.

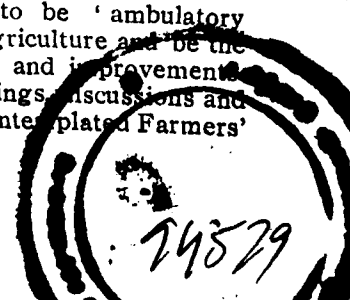
EARLY AGRICULTURAL EXTENSION WORK IN U.S.A.

By B. S. RAO

Student, B. Sc. II

Organizations known as Agricultural Societies were in existence somewhere at the beginning of the 19th century. They were either State or regional societies and their object was primarily to improve agriculture. This they did by disseminating agricultural information through their publications and lectures and by promoting the formation of local organizations for people engaged and interested in agriculture. The societies held fairs, where animals were sold, agricultural products were exhibited for prizes, and addresses were made by prominent agriculturists and scientists who were invited to give lectures. A large number of county societies came into existence as a result of their labour. By about the second half of the 19th century State Boards of Agriculture were formed in several States (by legislature). These Boards superseded, and carried on the work done earlier by the above mentioned societies. In addition they held short courses at the County Agricultural College, advocated the formation of Farmers' Clubs and sent lecturers to them.

The Boards expected these Farmers' Clubs to be 'ambulatory schools' which would awaken a deeper interest in agriculture and be the channels for the easy communication of researches and improvements. Local organizations in the counties were holding meetings, discussions and special classes. Such gatherings were similar to the contemplated Farmers'



Clubs and were very successful. In some counties such meetings and discussions were held at one particular place and at any convenient time, while in some others they were held at regular intervals and at various places in the county. Being very popular with the agricultural community, such gatherings increased rapidly in number and came to be called as Farmers' Institutes. The Agricultural Colleges in certain States were conducting Farmers' Institutes. The Boards were giving financial help in certain cases. The lectures when good, were printed and distributed, and in some counties farm papers were started giving special information about these institutes. With the States legislating monetary help, a more permanent basis was accorded to them. The lecturers underwent hardships and tried their best to get a good audience. The agricultural community took the fullest advantage by invariably attending these gatherings. The Ladies' branch of these institutes devoted attention to discussing subjects like dairying, poultry-farming, cooking, nutritive value of foods, etc.

The beginning of the 20th century saw the movement well rooted in U.S.A.,—so 'well grounded in public opinion and policy as to be recognized a part of the Governmental machinery'. On an average 2,000 institutes were held during a year and a total attendance of 500,000 farmers was recorded. Miscellaneous subjects were discussed and charts, photographs and specimens were freely demonstrated. Exhibitions were held and prizes offered to promote a competitive feeling. Two day-institutes were common (lectures, discussions, demonstrations, etc., at one place were generally carried on over a period of two consecutive days) though shorter period institutes were not rare (the longest not being held in winter). Soon American Association of Farmers' Institutes Workers was organized with the object of exchanging views and comparing experiences and to acknowledge the mistakes of each, so that others may not come across the same failures. Membership was open to workers in farmers' institutes and all States were fairly represented. Later on this Association was brought into closer contact with the department and a Farmers' Institute Specialist was appointed.

The Office of Experimental Stations recognized these institutes as useful agents in the dissemination of the practical results of their agricultural experiments. Fostered up by such organizations, the farmers' institute movement progressed steadily. The nation-wide expansion of this movement made it desirable to have a federal agency for the promotion of this great enterprise. The Secretary for Agriculture was requested to help the institutes in the matter of material and organization. Financial aid was obtained from the Congress and a specialist was appointed in the Office of the Experiment Stations. His time and energy were to be spent in visiting and advising the institutes, studying the problems of their management and elucidating the path by which the department might substantially help the movement. The Office of Experiment Stations published reports about the institutes and their work and also the nature of the extension work done in other countries for the benefit of these institutes. Lantern slides were prepared for distribution, outlines of lectures were printed, and the method of instruction was explained to the lecturers. The specialist visited these institutes and rendered useful help.

The rapid growth of the science and also the number of the institutes made it difficult for the lecturers in these institutes to pull on merely with departmental publications. So it became necessary to hold one or two week classes for these lecturers. To these 'Round up Institutes' farmers and others interested were allowed in certain States. There was also a demand for systematic education in the institutes and so the time was lengthened in certain cases and these became extension schools and short course classes, but still they were itinerant.

Side by side with these developed the women's institutes, and lady-lecturers were appointed for them. Lectures on domestic science, home economics, etc., were given, cooking competitions were held and circulating libraries were provided. The interest grew up in boys and girls and special clubs were organised for them. They grew crops by themselves and these were exhibited for prizes. They were taken on tours to farms and agricultural colleges and lectures were made to them. Thus a living interest was instituted in the younger generations. Schools and colleges took great interest in training the youths and this movement soon grew up by leaps and bounds.

A few of the subjects that were taken up in these institutes for lectures and discussions were:—Selection of seed, use of fertilizers, soil and moisture conservation, crops, diversification and rotation of crops, control of crop pests and fungus diseases, veterinary subjects, poultry, dairying, bee-keeping, horticulture, and general subjects like roads, economy in agriculture, agriculture as a profession, etc. etc.

The passage of the Smith-Lever Act gave more funds to the Agricultural Colleges for extension work and consequently less was proportioned to the institute movement. The colleges withdrew themselves completely to improve their educative work. The States also encouraged the Smith-Lever Act and were less generous towards the farmers' institutes. Vocational education was provided in the secondary schools. Due to these reasons, the movement declined considerably.

Special trains, well equipped with lecturers, charts, specimens, books, bulletins and other demonstration materials were run about this time. They halted at farming centres and the farmers received great benefit. The cost of running the trains was mostly met out by the Companies, while the colleges provided material and lecturers. This practice has died out in recent years. The companies had often helped in other ways of marketing, conveying bulls, pigs, etc.

It has been said that the colleges were carrying on extension work by successfully conducting farmers' institutes in certain States. Some others were providing lecturers and demonstration material both for the institutes and the special trains. In addition some were giving short courses, the time ranging from about ten days to two or three months. Some were giving postal tuition. By these courses, in a few years, a large number of people living near as well as far away from these colleges received the benefit of their instruction. People so trained took an examination at the end of the course. Further itinerant schools were conducted, experiments were carried out and bulletins were printed for distribution. Universities organised extension branches to successfully carry on such work. In some

universities a special officer was appointed and he was in charge of the correspondence courses. He was also to visit the farmers' institutes, promote the formation of boys' clubs and in general to awaken an interest in the younger generation. The extension work done by the colleges having increased enormously, a committee was formed to co-ordinate and organize under definite lines the work done by the various colleges in U.S.A. The committee recommended a director and a corps of young men attached to each college extension branch so as to reach those who could not come to the college. These colleges were working in co-operation with all other organisations conducting extension work. A development was effected which completely separated the college work from that of the extension. Care was taken to see that extension work was not a plan to trap students to the college but fundamentally a means of reaching the farmer at his door. With the appropriation of State funds the colleges were able to carry on the work on a broader basis. A committee appointed drew up an elaborate plan for the extension work, urged the employment of capable men, advocated special training for such men and wanted all extension work to be carried by the colleges alone.

By about this time Professor Knapp established a number of demonstration farms to prove his theory of diversified agriculture—principally in introducing cotton. He believes that demonstrations carried by public expenses were not so impressive to the farmer as those carried by himself on his own land. The invasion of the cotton weevil induced the farmers to co-operate in meeting out the attack. A large amount of the money set to fight against the pest was placed at the disposal of Prof. Knapp 'to bring home to the farmer, on his own farm, information which would enable him to grow cotton despite the presence of the weevil.' Large numbers of agents were employed, who gave lectures and induced the farmers to hold demonstration on their own farms. The farmers heartily co-operated with the agents and better methods of farming and new ways of facing the weevil were experimented. Such farm demonstrations were successful and profits were reported in due course. The General Education Board of U.S.A. became interested in this movement and gave financial help to those States, which could not maintain sufficient agents by themselves. Farmers' Banks and many such other organisation came forward to help this enterprise. Negro agents were employed for the negro farmers. The object of this movement as stated by Prof. Knapp was for the economic betterment of the farmer by improving his cultivation. The movement soon gained a good hold among the farmers and came to be known as the Farmers' Co-operative Demonstration Work.

Advantage was taken of the existing Boys' Clubs and they were asked to grow certain crops on their own lands. Corn being popular, a large number of Corn Clubs were started by the boys. Better cultural methods were induced in the younger generation by holding competitive exhibitions. The interest was taken by girls also and Tomato Clubs became very popular with them, poultry and vegetable clubs were also formed. The popularity of the movement enlisted the co-operation of the Education Board. Ladies took great interest in these clubs, and agents who came to visit these farms, especially lady agents, always found occasion to give a word or two of advice, that spared the ladies from many a domestic dilemma.

When the farmers found these demonstrations to be profitable, they were not only eager to apply these proved principles in their extensive agriculture, but also ready and willing to carry out new demonstrations. Unfortunately for the movement Prof. Knapp breathed his last. The authorities took a wise step in appointing his son in his place, who imbued with his father's ideals and working with the same earnest zeal more than justified their choice. Being a federal enterprise from the beginning, best hands were selected for carrying on the work of the agents so that these people could tackle with the local difficulties. At the beginning, the colleges and the Office of the Experiment Stations viewed this movement with disfavour, but soon their strong hold on the farmer attracted them. They began to co-operate and this was a great advantage for the agents, for when they were not able to cope up with some knotty problems, they could receive some enlightenment from such institutions.

The Bureau of Plant Industry organised the Farm Management Office which carried on extension work in the south by employing county agents. These agents worked in co-operation with all other organisations carrying on extension work. Chambers of Commerce, Boards of Trade and many other private associations took a great interest in the promotion of the county agent work. Cases are not rare when private gentlemen donated liberally for the cause.

The extension work carried out by the colleges by this time increased so rapidly that it badly affected their teaching and research. So these colleges demanded federal funds, primarily to meet the expenses of the extension work and also to stimulate State appropriations. As a result of this the Smith-Lever Act was passed by the Congress which liberally financed the colleges for carrying on extension work only. As a result of this, the colleges were enabled to carry on the work on a greater scale.

The various agencies concerned in this propaganda work were working harmoniously for they had recognised that their end was the same. Though the farmers' institute movement declined in the latter years, the county agent work in the south, the farmers' co-operative demonstration work in other places and the colleges in all States carried on the extension work. The department was merely doing control work. The same organisations did good work at the time of the Great War when there was a heavy demand for increased supply of food-stuffs.

In conclusion, the national enthusiasm for bettering the economical condition of the farmers is worth mentioning. Chambers of Commerce, Boards of Trade, Private associations and gentlemen have time and again contributed their mite for the cause. The willingness of the farmer to co-operate with these agencies is highly commendable. Special mention must be made of the employees in the various movements who without heeding petty hardships plunged headlong into the enterprise. The schemes proposed were always comprehensive and workable. It is praiseworthy that the Colleges should have taken to extension work in addition to their teaching and research. The Congress, States and private agencies were generously helping the right cause. It must not be forgotten that the various movements were marching hand in hand towards their goal.

AGRICULTURE IN RUSSIA*

An examination of the available data to ascertain the nature of the changes that have taken place in Russian agriculture since the Revolution and the possibilities of further expansion in production and exports of corn, undertaken recently by the International Institute of Agriculture, has shown the following results.

In so far as Russian industrial activities are concerned, the Revolution resulted in the almost complete transference of control to the State. As regards agriculture, however, control for the most part still remained in private hands, and in consequence it was inevitable that difficulties would arise as between industrial and agricultural interests. These difficulties had several phases, starting with the forced requisitions of agricultural products during the period of so-called 'War Communism', followed by the 'new economic policy' that allowed greater freedom of action to the peasants, while a further phase commenced with the putting into operation of the 'Five-Year Plan.' This 'Five-Year Plan' which started with the economic year October 1928 to September 1929, provides, with regard to agriculture, for what is described as reorganization on a collective basis. The reorganization of agriculture is to be accomplished by the provision of large and increasing supplies of agricultural machinery and fertilizers in addition to the wide dissemination of technical and other propaganda, while 'collectivization' involves the grouping together of the huge number of small peasant holdings.

The 'collectivization' of agriculture is being carried on in two directions, viz: by the establishment of State farms and of collective peasant farms. Among the State farms a number are organised especially for the purpose of cereal cultivation, to a large extent on fresh land. There exist at the moment 175 of these specialist cereal farms with a total area of approximately 30 million acres. As many as 50 of these have an area of over 250,000 acres each, while four exceed 500,000 acres each. These farms are not as yet being utilised to their fullest extent; still, that progress has been made is indicated by the fact that State farms are as a whole estimated to have accounted for double the percentage of the total area under cereals in 1930 as compared with 1928.

Collective farms represent groups of individual peasant holdings operated as one farm. The land is the common property of the peasants concerned, but degrees of difference exist as to the extent of common ownership in the buildings and the live and dead stock, and as to the manner in which the results of the harvests are divided. Rapid increases appear to have been recorded in 'collectivization.'

Substantial increases are noticeable in the numbers of tractors in Russia. In 1930 the power of the tractors available for agriculture was 900,000 horse power, while the corresponding figure for 1931 is stated to

* Abridged from an article in the *Journal of the Ministry of Agriculture* for June 1931.

exceed 2 million horse power. In 1924 the total number of tractors was 3,000, which had risen to nearly 32,000 in 1928. The tractors are, for the most part, put at the disposal of 'tractor centres,' which contract with collective farms to do their ploughing, sowing, harvesting, etc. In payment the tractor-centres receive one-quarter of the harvest, and in addition the collective farm undertakes to deliver to the centre, at prices fixed by the State, the surplus balance of the harvest after deducting any amounts required for food, etc., on the farm. According to the Five-Year Plan, by the Spring of 1931 these tractor centres were to number 1,105, with machines developing 692,000 horse power. The use of artificial fertilizers, though it has made considerable progress, is still, however, relatively limited.

Turning to the actual area and production of cereals in Russia, what is noticeable is that over 40 per cent of the total area falls under the heading of productive land; but of this nearly two-thirds is under forests, arable land representing somewhat more than one-half of the remainder. About 53 per cent of the land would appear, as a whole, to be unsuitable for crops, although in some degree lending itself to stock-raising.

It is noteworthy that over a greater part of Russia the predominant rotation is one of three years, with the land lying fallow every third year. In consequence, about 30 per cent of the arable area is fallow land, and the general adoption of a more modern system of farming would obviously enable the total output to be increased irrespective of any extension of the total area. Over the whole period from 1925 to 1930, the sown area has risen by nearly 60 million acres or about 23 per cent. And over one-half of the increase in area has occurred in cereal cultivation.

The area and production of the principal crops in 1930 were both much in advance of the 1913 level, with the single exception of barley. Much of the increased area under cereal crops has been devoted to wheat-growing, the area under wheat having risen from some 63 million acres in 1925 to 86 million acres in 1930. The area under barley, oats and maize has also been extended, but in the case of rye the area has been reduced.

Looking at the yields of the principal cereal crops, we find a very marked increase in the production of wheat in 1930. During a period of six years (1925-30), the highest figure for wheat was nearly one-third more than the lowest. Equally noticeable variations have occurred in the average yields of barley, oats and maize, although the yield of rye has been decidedly more stable.

With regard to other crops, important extensions have been planned to take place in the areas devoted to sugar-beet, cotton, flax and tea. During 1931 the area under sugar-beet is to be raised to 3½ million acres, which would represent an increase on the year of 31 per cent. The area devoted to cotton in 1931 is to be 5,700,000 acres, from which nearly 2 million tons of raw cotton are to be obtained, or nearly one-half as much again as the corresponding figure for 1930. Compared with 1930 the area under flax is to be increased in 1931 from 14 per cent to 5,200,000 acres, and in consequence it is anticipated that the output of flax fibre will rise from 410,000 tons to 560,000 tons. In regard to tea it is proposed to plant in 1931 a

further area of 33,000 acres and to prepare an additional area of 39,000 acres for the same purpose. State tea farms are to be organised on a large scale.

If one turns to the live stock side of the agricultural industry, he will find that marked increases were recorded between 1924 and 1928, and in the latter year the numbers were, with the exception of horses, well above the totals in 1916. In 1929 further slight increases occurred in horses and sheep, but cattle and pigs declined in number, while in the next year all classes of live stock suffered heavy reductions. The International Institute of Agriculture ascribes the reductions mainly to the policy of 'collectivization', as a result of which the peasants slaughtered or sold for slaughter larger numbers of animals. At the same time the Institute points out that fodder crops were poor in 1929 and in some areas in 1930 also. The Soviet authorities, it would appear, are taking steps to deal with the situation partly by restricting the slaughter of young stock, and partly by establishing special State and collective farms for stock-raising.

Apart from the effect of any measures that may be taken to rehabilitate the live stock industry, it is clear that strenuous efforts have been and are being made to increase the cultivated area, particularly in regard to wheat-growing. Moreover, the possibilities of extension appear to be considerable, partly through the breaking up of fresh land and partly by a modernisation of the rotation. Probably of equal importance are the measures that are being taken to stimulate productivity by the increased use of machinery and fertilizers and by the dissemination of propaganda. While variations in the yield per acre are marked, it is impossible to resist the conclusion that under normal climatic conditions large increases in output must be expected if the present programme is carried through.

THE GOAT¹

From time immemorial the goat has been of very great importance to mankind in supplying milk and meat. In olden days it was a very important domestic animal. By and by its place was taken up by certain other animals. It is said that the goat is very important in the first and last stages of the development of agriculture. This is quite true.

For some reason or other the goat is not popular with the middle class people of India. There are many families which cannot afford to have a cow and yet desire to have wholesome milk. To them, the goat proves to be very useful. Generally, people find it very expensive to maintain a cow. But to maintain a goat is very cheap. Hence the goat is said to be 'the poor man's cow.'

Apart from its inexpensiveness, goat's milk is an ideal food for children and is as good as human milk. Goat's milk contains all the necessary nutritious ingredients such as fats, proteins, sugar and minerals which are required for the development of infants. It contains less fat than cow's

¹ A condensed note by B. KRISHNA RAO from an article by Mr. N. R. JOSHI in the *Allahabad Farmer* for April 1931.

or buffalo's milk, and hence is easily digestible. Goat's milk is very good for people suffering from hyperacidity since it is alkaline in reaction. Cow's and buffalo's milk is liable to produce tuberculosis, but the same cannot be said of goat's milk. The disagreeable smell which is so characteristic of goat's milk, can be got rid of by keeping the animals clean and under proper conditions. Two main causes for this are: (1) the animals are not clean; and (2) the does are in constant company with the bucks.

Selection of Goats.—When a man buys a goat, his first consideration should be about the milk pail. In a doe, the head should be neat and feminine and not rough-looking. The body should be long and deep. The skin should be thin, and loose with soft fine hair. The udder should be large and at the same time thin in substance and soft to touch. The teats should be fairly long and tapering. Healthy goats are always alert and active, with bright intelligent eyes. The buck must show a high state of vigour and be an offspring of a good milker.

Breeds.—There are several kinds of breeds of goats in India which through lack of interest and ill-judged breeding have grown worse. Prominent among them are the Jumna Pari, the Barbarian, the Chitral, the Gujerati and Kiaed. The Anglo-Nubian breed is a cross between the Barbari and the English goat.

Care of the goats.—Milch goats, like dairy cows, should be taken care of. The does should be kept in separate pens before kidding. Milch goats usually drop twins or triplets and undergo a gestation period of about five months. They breed almost immediately after kidding. But it is better to breed them in such a way that they will kid thrice in two years. To get the largest production, they should be allowed enough rest period.

Feeding of goats.—The majority of goats feed on brushes and weeds on waste lands. If they are fed in this way they cannot be expected to produce the maximum of milk. Goats should be fed just in the same way as dairy cattle and whenever possible should be given some hay and a little nibbling at different brushes. Grain also should be given to good producers. The bucks should be given grain, specially during the breeding season, and must be kept separate from the does. Salt and water should always be given to goats.

Milking.—Goats should be milked in quarters away from their stalls; otherwise the milk will be infected. The bucks must be removed from the milking stall. Before milking, the udder should be thoroughly cleaned, and then the doe might be milked.

Health of Goats.—Great care should be taken about the health of goats, since they are subject to disease as other domestic animals are. The stall should be clean and comfortable, and the surroundings must be sanitary, to guard the animals from most of the common ailments. The goats should be given clean and proper feeds, care being taken to see that the animals are not kept on wet, low, marshy places,

INDIA'S WORST POULTRY PEST

(By D. SPENCER HATCH)

The Indian fowl tick, *Argas persicus*, may become the worst pest the poultry keeper here has to contend with. All efforts should be made to prevent its becoming established in the poultry plant. If it becomes fairly established it will prevent success, and is almost impossible to get rid of.

To cope with these huge ticks, which when full grown are often more than $\frac{1}{2}$ inch long, one of the best methods is to have tick-proof perches. Such perches must not touch the walls of the house nor be supported from the floors, unless water or oil cups are provided on the uprights as I have described under methods of controlling mites. The perches may be suspended from the roof by fine wires.

Tick Traps

You can catch the ticks which have been lucky enough to get on the fowl, by setting traps for them. They gorge themselves, sucking the fowl's blood during the night, and then start for their day-time hiding places. If you tie a piece of flannel round each support of the perches, the ticks, sluggish, lazy and sleepy from dining too well, will stop in these first hiding places they come to. Every day you can remove the flannels and destroy all the ticks you find there. The traps are then reset for another night's catch.

Still another effective trap is made by laying a line of freshly slaked lime about an inch deep on the floor of the poultry house, all the way round, close to where the walls meet the floor. When the ticks start on their nightly search for fowls to bleed, they attempt to cross this line, get buried in the lime, and perish.

When ticks are actually found on the birds, the heads will generally be found firmly attached to the skin of the fowl. Kerosene oil 60 per cent. mixed with coconut oil 40 per cent. can be swabbed on the clusters of ticks and is very effective. The coconut oil prevents the kerosene from burning the skin of the fowl. This mixture can be put on with a spray, or flit gun, if one prefers.

Neem oil is also very good, and may be rubbed on to all the places where ticks are sucking blood on the fowls.

As a further preventive of ticks the poultry house may be built on legs which keep it off the ground. Around the legs keep at all time wet coal tar or freshly slaked lime. In building the house all pieces of wood used in construction should be dipped in hot coal tar, especially seeing to it that all cracks, crevices and joints are thoroughly saturated with tar.

Tick Fever

These ticks, as well as draining the fowls of their blood, are thought to infect the fowls with a very serious fever. If the ticks are infested with the fever parasites, they inject them into the blood of the fowls they bite, where the parasites multiply rapidly and set up fever, causing the death of the birds. Every bird so infected may infect more ticks which bite it, and these ticks in turn infect more fowls. Ticks may for several months be carriers of this fever, called spirochaetosis.

Symptoms.—When infected with tick fever, the bird begins to droop and becomes listless; the head and comb become pale and the skin over the body takes on a bluish hue; there will be severe diarrhoea, often loss of the use of the legs, and death may come in less than a day's time.

Inoculation

Fortunately there is a successful inoculation for this fever, and if it is given at the first sign of the disease the bird will not only recover, but it will be for ever after immune from further attacks. It has been found that birds which have had the fever and recovered may be infested with fever-giving ticks and be quite healthy. When other healthy birds were put in with these, they developed the fever as soon as the ticks went on to them.

The inoculation is described by Mrs. A. K. Fawkes, of the Government Poultry Farm, Lucknow, as follows:—The injection sounds difficult but in reality is a very simple matter. You must, however, procure an ordinary hypodermic syringe from your chemist, the cost of which will be about Rs. 3-8. You must also lay in a small stock of 'Soamin.' This drug is kept by most chemists. The powder should be dissolved in clean boiled, or distilled water. The chemist would give you the drug in either tablet or powder form, or in solution if you will give him the prescription. If you have a little medicine measure and scales it is an easy matter to do it yourself. Soamin being a preparation of arsenic, care must be taken to be accurate. The syringe you will find marked in divisions 'c.c.' and the dosage is as follows: Chickens 4 to 6 ounces in weight, 1 millegramme of Soamin in 1 c.c. water; fowls 4 to 5 lbs. 8 to 10 millegrammes of Soamin in 1 c.c. water; fowls 6 to 10 lbs. 12 to 20 millegrammes of Soamin in 1 c.c. water: i.e., 2 millegrammes to every 1 lb. or one-third grain, to every 3 lbs. of body weight. The chemist will make you up tabloids or weigh your powders each containing one-third grain, which is the usual dose for a moderate-sized bird.

The injection must take place as soon as ticks are suspected, and be repeated in 24 hours time. To inject, select a place on the fowl's breast where you can feel the muscles are situated—paint a small surface of the skin with iodine and inject the preparation by means of the needle, into the breast muscles. Keep the patient quiet and feed it on light, easily digested, nourishing food such as beaten-up egg and milk, or soup. It is everything to keep up the bird's strength. As a precaution, if ticks are found on the farm, inoculate all birds liable to be attacked.—*The Madras Mail*.

AGRICULTURAL NOTES (FROM ASKA TALUK)

By G. JOGI RAJU, DIP. AG.

District Agricultural Officer, Vizagapatam.

The body of a country plough in a village near Aska measured 13 inches across. 10 or 11 inches is not an uncommon width. Very shallow ploughing is aimed at. But for this lightness of the soil, the local cattle should find it impossible to draw these ploughs. For this kind of work, H. M. Guntaka No. 1 is more suitable, offering less resistance than the plough in use.

* * *

In another village, the covering of Ragi seed in a nursery was being done by driving a herd of cattle over it. The plot was ploughed, levelled by a 'mhoe' (ladder), seed sown, trampled over by cattle, and levelled again. This is an instance of compacting soil to ward off the evil effects of heavy rain or drought.

* * *

Burning dried dung, without making cakes out of it, in which case it is at least partly economised by the admixture of paddy chaff, etc., is one of the worst features of the economics of an Oriya ryot. It is therefore, refreshing to note that in Khandravaly, a village nine miles from Aska, where plenty of fuel is available from the neighbouring jungle, little or no dung is burnt as fuel, showing thereby, that if he can obtain fuel without much expense or trouble, even the Oriya ryot will not stick on to such a pernicious custom.

* * *

In the same village, some ryots floor their cattle byres with thick bamboo thatties which are said to last a whole year. Over a mud or rough stone flooring, a layer of earth or sand is spread slopingly, and over it the thattie is laid. While the dung of cattle tethered on this is removed, the urine gets into the layer of earth below. This keeps the cattle clean, but in most cases, the soil below is kept on too long, so that it does not absorb the urine which, therefore, begins to flow out. If the soil is frequently renewed, the byre will be quite clean.

* * *

A few well-to-do ryots in several villages possess 'pucca' byres with a rough cement or stone floor and urine traps which are kept quite clean. But in most cases this system is badly copied, and this makes the byre very insanitary with pools of stagnating urine on a very uneven floor.

FARMING CALENDAR FOR THE COIMBATORE DISTRICT

September-October (Tamil Purattasi).

The month of *Purattasi* marks the transition period from the South-West to the North-East Monsoons. Autumnal equinox falls in this month on the 22nd of September. Necessarily the sun's rays are more vertical in the southern districts of this Presidency. The days are therefore very hot.

Thunderstorms, characteristic of the transition period occur now and then. Heavy showers are occasionally received. The Tamil proverb *பெய்தால் பெய்யும் புட்டாதி, சாய்தால் சாயும்* shows that it may or may not rain in this month. Another proverb runs to this effect: *பொன்னுருக்கையும், மண்ணுருக்கப்பெய்யும் புண்ணியப்புட்டாதி*. 'In the good month of *Purattasi*, the sun will be so hot as to melt gold and the rains so heavy as to "liquefy" the earth.' This saying is significant of the character of the weather of this month as described above. The rainfall ranges from 2½ to 3 inches. The latter part of the month is usually characterised by heavy showers and the average rainfall is at times exceeded. Good thunderstorms in the month is indicative of a satisfactory North-East Monsoon.

The dry sowings of the previous months often show signs of withering owing to extreme heat. This does not matter much in the case of young crops which recover rapidly with the advent of North-East Monsoon rains; but if the crops are much advanced due to sowings very early in the season, then they are prejudicially affected by the drought of this month. Experienced ryots, therefore, do not attempt sowings early in the season—June or July—even though good sowing rains are received at the time.

The month is again a trying period for the transplanted paddy in single crop wet lands. The plantings of August undergo a severe ordeal owing to deficient supply of water in the channels. If thunderstorms expected this month prove a failure, ryots' anxieties are intensified. Here, contrary to what obtains in dry lands early plantings do successfully withstand the drought.

In double crop wet lands in the canal valleys, at Erode and Dharapuram, first crop of paddy is harvested and rapidly prepared for the market, the short dry spell of the month affording facilities for this operation. At the same time preparation for the second crop is also progressing.

Ragi harvest is continued. Cambodia sowings are also proceeded with.

The Garden farmer's concern is mainly to keep his garden crops going on by frequent irrigations until the Monsoon sets in.

With the help of the few thunder showers that may be received, dry sowings are taken up in black soil areas. Cholan is sown first and cotton afterwards. Dry cotton, sown in this month, comes up very well. The young crop is sufficiently advanced by the time the heavy rains of the Monsoon are received, and thus enabled to withstand the excessive rainfall.

Sugarcanes planted in *Adi* receive a top-dressing of manure and the crop is well hoed and ridged up.

In certain villages, the very last stages of sugarcane harvest and jaggery manufacture are in evidence.

Plantations of Cocoanut and Arecas and Plantains as well are dug up and soil left loose to get the benefit of the North-East Monsoon showers.

Harvested fields in the garden area and fallow lands in the dry area are worked up and brought to condition for cold weather crops like Wheat and Bengal gram.

Notes and Comments

A Preliminary Soil Survey of India.—The Imperial Council of Agricultural Research, at a meeting of its Advisory Board, decided to recommend to the Governing Body the carrying out of a preliminary soil survey of India. It will be remembered that the Royal Commission on Agriculture in India did not enthusiastically support a general soil survey except in the case of specified areas and for special reasons. It is, therefore, refreshing to note that in spite of this recommendation of the Agricultural Commission the Advisory Board of the Imperial Council of Agricultural Research recommended for the consideration of the Governing Body the carrying out of a soil survey of India. Madras has carried out soil surveys of Tanjore, Guntur, Kistna, Godavari, Periyar and Malabar. These surveys were of a simple nature and were limited to swamp paddy soils, the general conditions of cultivation of which were almost similar in the different tracts. Further, the samples collected were only of surface soils and the analyses made were simply chemical. The proposed soil survey of India must necessarily be of a different nature, and a classification based on geological formation will not be as useful as the classification based on climate, rainfall, crops and agricultural practices. Side by side with the soil survey, it is very necessary that a survey of underground waters should be systematically carried out, as this will be of very great use in deciding upon the areas through which irrigation projects should run. The money spent on irrigation projects would be well spent if such projects are laid in areas where underground water is very deep and well-boring is a heavily expensive item, as compared with areas where underground water supply is nearer to the surface and existence of wells is a common feature.

Tobacco Problems.—Another item of interest which the Advisory Board of the Imperial Council of Agricultural Research considered at its recent meeting was in respect of the tobacco problem arising from the application of the Government of Bengal for the appointment of a Cigar Curing and Blending expert. In the course of the discussion it was elicited that the chief tobacco-growing provinces are Bengal, Madras, Bombay and Bihar and Orissa, and the problems of the different provinces were necessarily of a different nature. The purposes for which tobacco is used in Madras are for snuff, for chewing, for cigarettes and for cigars. For the

two former, the local methods for curing are adequate. It was pointed in the discussion that cigarette and cigar manufacture in Madras are in the hands of big firms who are devoting their attention to the problem of curing, and in regard to cigars the question is not so much of curing as of the growing of a tobacco which would be suitable as a wrapper for cigars. The Board, in the end, held that different provinces might have different problems of their own in the matter of tobacco research, and agreed to invite the provinces to submit schemes of research dealing with their specific tobacco problems for consideration at the Board's next meeting.

The Malting of Cholam.—The Government of Madras submitted an application for a grant for investigations on the chemistry of the malting of cholam. This investigation has been in progress for a number of years and a good deal of useful information has already accumulated. The industrial and commercial utilisation of cholam and its malting process in the preparation of malted foods to replace the imported products like Benger's Food, Mellin's Food, Horlick's Malted Milk, Malt Extract, Grape-nuts and others demands attention. The imports into India of malted foods were of the value of nearly Rs. 30½ lakhs in the year 1927-28. Malted foods are popular in South India and their usefulness is generally recognised. It is almost the only food given to invalids and is very widely utilised as an infant food. The rich, the middle and even the lower middle classes have taken to its use freely. Food preparations having malt in them form part of the food of the rich and the higher middle class homes. The poorest classes have, however, not taken to this even as infant and invalid foods, primarily because of the prohibitive cost. With a suitable reduction in price and propaganda at health exhibitions and child welfare centres, it should be possible to place these foods even within the reach of the poorest, and thus to improve the general health of the nation and at the same time to open out a better utilisation of the agricultural products of the country. The application by the Government of Madras for a grant has not been made a day too soon, and it is refreshing to note that the Board has seen fit to recommend the investigation for the consideration of the Governing Body, although in a crippled form.

The M. A. S. U. Parliament.—The Madras Agricultural Students' Union has instituted a new scheme according to which a 'parliament' known as the M.A.S.U. Parliament will meet from time to time, at which different subjects bearing principally on the agricultural interests of the country are to be discussed. The first of a series of discussions arranged by the Secretary, came off before a large gathering on July 8, under the chairmanship of Rao Bahadur T. A. Ramalingam Chettiar, at which Mr. K. Ramayya, the Paddy Specialist, proposed that any further extension of the area under paddy in the province was not desirable, while Mr. T. V. Rajagopalachariar, Vice-Principal, opposed the motion. An interesting discussion followed, in which many members spoke for and against the motion, and the proposition moved by Mr. Ramayya was defeated by a small majority. The second discussion took place on July 23, before a crowded house under the chairmanship of Rao Bahadur M. R. Ramaswami Sivan. Rao Bahadur B. Viswa Nath, F.I.C., Government Agricultural Chemist, moved 'That the export of indigenous manures from India is not conducive to the welfare of the country. Mr. C. E. Wootton, B.Sc., Chemist, Messrs. T. Stanes and

Co.'s manure works, ably opposed the motion. There was a very lively discussion at which several members spoke on the pros and cons of restriction. On voting, the motion was carried by a large majority.

Some Undesirable Practices.—Mr. S. K. Roy makes an interesting contribution to the columns of the *Allahabad Farmer* for April 1931 on the 'Study of the Allahabad Vegetable Market'. He points out certain bad habits which are detrimental to the vegetables, namely, the use of bags of vegetables as seats, beds and connecting bridges for walking over, and shows how as a result of so doing, vegetables and fruits get bruised and rapidly deteriorate. Another very unhealthy practice he refers to is that of thrusting finger nails in vegetables to ascertain the degree of tenderness. A little reflection shows how pernicious this (innocent-looking) habit is. With each finger thrust, the vegetable is inoculated with all sorts of dirt and micro-organisms which contribute not only to the rapid deterioration of the vegetable (so treated) but also to the spread of disease. We are sorry to admit that this is the misfortune not only of the Allahabad vegetable market but practically of every vegetable market in India.

Indian Rural Reconstruction.—Sir M. Visveswaraya has published in a recent number of the *Hindu* a scheme of his own for rural reconstruction. The scheme deals with two important aspects, namely, increase of production and improvement in the working efficiency of the villager. The working unit of his scheme is the Village Improvement Association and Council adapted from one in operation in Japan, where agriculture is conducted on the principle of family scale as in India. Any scheme of rural reconstruction must be capable of directly benefiting the small farmer; otherwise its value as a potent factor in rural reconstruction is considerably minimised.

Rice Research.—The Imperial Council of Agricultural Research has sanctioned a number of rice research schemes in the various provinces of India, the total cost of all the schemes amounting to nearly 10 lakhs of rupees to be spent in 5 years. The Empire Marketing Board is contributing about 2 lakhs of rupees to meet part of the expenditure connected with the schemes of Burma and Bengal. The grant of just over a lakh of rupees allotted to Madras is proposed to be utilised for opening a Rice Research station in Ganjam district.

Bureau of Statistics for Madras.—The Madras Legislative Council recently appointed a committee to go into the factors contributing to the present economic depression. This Committee has found that the facts and figures are not accurate and reliable, and has suggested the formation of a Bureau of Statistics.

Regulation of Markets for Crops.—From a recent telegram appearing in the *Hindu*, we understand that the Government of Madras is contemplating to shortly publish a Bill for the establishment of regulated markets for commercial crops, and that the Bill is likely to be introduced in the August session of the Legislative Council. The object of the Bill is to get for the producer a fair price for his produce under fair conditions and with full knowledge of prices ruling elsewhere. It is likely that cotton will be the first crop to be dealt with.

Higher Agricultural Education.—The members of the Agricultural College Selection Committee consisting of Dewan Bahadur M. Ramachandra Rao, Dewan Bahadur C. S. Ratnasabapathi Mudaliar and Khan Bahadur P. Khalifulla Saheb have recently addressed the Government suggesting various improvements for the better working of the Agricultural College, Coimbatore, and to make it more useful to the agricultural population.

They have brought to the notice of the Government the utterly inadequate accommodation for students seeking admission into the College. During the last four years applications for admission into the College were about 350 to 400 per year. But accommodation at present available in the College was only for 48 students. This was absolutely insufficient and the members were of opinion that accommodation could be provided for at least 50 per cent more with a small addition to the staff and with slight amount of expenditure on equipment. The Committee have urged on the Government the immediate examination of this question and that by July next provision should be made at least for 75 students. The question of hostel accommodation should also be considered and suitable temporary arrangements would have to be made pending construction of hostels.

The Committee have also drawn the attention of the Government to the desire on the part of the students to secure knowledge about agriculture and allied subjects and have pointed out that it would be a great pity not to encourage this desire. In their opinion, there had been a change in the angle of vision of the students in favour of making much more use of their own lands than seek service in the department. The Committee felt that either in the College or in the various demonstration farms a short practical course of six months containing essential principles of agriculture for those who wished to improve their lands, should be undertaken by the Government.

We hope the suggestion receives the careful consideration it deserves. We may, however, point out that the scheme would receive a powerful impetus if the claims of agricultural graduates are considered on a par with those of the other graduates for entertainment in the revenue and other departments. We shall then have plenty of men with a distinct bias and knowledge of agriculture. Another suggestion is to induce the Andhra University to open an Agricultural Faculty.

The late Dr. K. Kunhikannan.—We regret to record the sudden demise of Dr. K. Kunhikannan, Entomologist to the Government of Mysore. A scientist of great abilities, Dr. Kunhikannan was also interesting himself in public and social movements. In his death the Mysore Government has lost a capable officer and the Entomologists in India a highly respected colleague. We offer our condolences to the bereaved family.

The Ramasastrulu-Munagala Prize.—We understand from the Secretary, Madras Agricultural Students' Union, that the prize this year has been awarded to Mr. C. Jaganatha Rao for his paper on 'The effect of time of planting on some economic characters of the cotton plant.' We congratulate Mr. Jaganatha Rao on his achievement.

Gleanings

Feeding Rice on the Farm.—Feeding experiments on cattle and hogs were successful. Cattle did almost as well on a straight rice diet as they did on corn, and on a feed of rice plus corn they put on weight as rapidly as they did on a mainstay diet of corn alone. With hogs, rice alone gave results equal to those obtained with corn alone. Of course, with all these flesh-making diets there were the usual additions of oilseed meal, alfalfa, or other protein foods, together with the necessary mineral and other diet accessories.—*Science, February 20, 1931.*

Consolidation of Holdings.—The evils of fragmentation of holdings are too well known to need reiteration. In fact in some parts of the country, agricultural holdings have been so reduced that effective cultivation is an impossibility. The report of the Royal Commission on Agriculture in India points out an instance in Ratnagiri where the size of the individual plots is as small as 30½ square yards. Fortunately, conditions in Madras have not come to this sorry pass. But the system prevalent in this country is such that it is bound to result in further fragmentation of the already existing small holdings unless efforts are made to counteract them. Although attempts are made to introduce effective legislation in certain provinces of this country, the Royal Commission on Agriculture have expressed themselves that

‘the need for caution in any attempt to interfere with the rights in agricultural lands needs no stressing, and we trust that, in any scheme involving the uprooting of people from their ancestral fields, full provision will be made for the utmost possible consideration of their opinions and prejudices.’

It is, therefore, left to individuals to try to mitigate the evils arising from fragmentation by consolidation of holdings by exchange or purchase or both. Two such instances have come to our notice from Guntur Circle. In a village called Macherlavaripalem in the Nellore District a young ryot has, by exchange and purchase, consolidated plots extending to 2½ to 3 acres and constructed high bunds to hold rain water in times of scarcity. A rich landlord who is also the President of the Village Panchayat Court at Zammalapalem has by exchange consolidated his scattered and fragmentary holdings and has a compact block of 80 acres. Examples like these will go a much longer way than any legislation on the part of the Government. There is no doubt the germ is there but it needs careful nurturing.

—*Quarterly Digest of the Madras Department of Agriculture. No. 86.*

Correspondence—Queries and Answers

I

Variation in Duration of Crops

To

The Editor, Madras Agricultural Journal.

Dear Sir,

It is my personal experience that a crop like cholam is influenced in its duration by certain factors obtaining in certain localities, e.g., Summer Cholam (yellow) matures in about ninety days round about Peelamedu while at my place, the same variety takes about a fortnight longer to come to harvest. This difference in the duration is an important factor to be considered by us farmers. I write to enquire whether you or any of your numerous readers are aware of the factors, internal, external or both, influencing duration of garden crops.

There is one view here, which holds that fertility of soil and other cultural operations meted out influence the duration. Our soils being poorer than soils round about Peelamedu, make our crops longer in duration. Within my own experience, a field with stony substratum was improved by removal of stones (Kankar, Gravel, etc.) to a depth of 2 feet and substituting good soil from external sources. My crop of cholam over this area flowered and matured about a week earlier than the crop over the rest of my area. I shall be thankful to have further information on this subject.

PERIANAICKENPALAYAM,
COIMBATORE.

Yours, etc.,
R. RAMAKRISHNA.

II

Rapid Propagation of Sugar-Cane

To

The Editor, Madras Agricultural Journal.

Dear Sir,

In reply to the letter published in page 270 of the June issue of the *Madras Agricultural Journal*, I wish to inform you that the rapid propagation crop was attacked by white ants and shoot borer which reduced the yield to some extent. In the year 1930-31 from 12 cents enough setts to plant 3.11 acres at 12,000 setts were obtained. This method is chiefly useful where harvesting and planting do not come at the same time or when any new variety is to be introduced. The percentage of germination was also more than the ordinary setts got from the top halves of canes. If the

whole length of fully matured canes is used as setts, the bottom halves mostly fail to germinate and are more damaged by white ant attack. The short crop provides better and more vital planting material and that cheaper than the cane setts to be locally had in and around Palur.

ST. THOMAS' MOUNT,
July 17, 1931.

Yours, etc.,
K. UNNIKRISHNA MENON.

III

Artificial Fertilizers

To

The Editor, Madras Agricultural Journal.

Dear Sir,

Your 'Notes and Comments' in the June edition of the *Madras Agricultural Journal* contain a paragraph in reference to an article by Mr. C. M. Hutchinson on artificial fertilizers. The tone of your comments, if I may say so, engenders further critical comments from your readers. I trust, however, that you will realise that, whilst I may be what you would call 'only a Propagandist for Fertilizers', I am also an agriculturist and a scientist, and it is from such a viewpoint that my remarks below are written.

You will recall that, following Mr. Hutchinson's conclusion that the use of artificial fertilizers in India was an economic proposition, you italicised, with some emphasis his remark :

'All that remains to be done is to discover by experiment the best way to make use of them and hand this information on to the ryot.'

Later in your quotation from his article, you further emphasised the statement, that

'Any doctrine declaring that these (indigenous fertilizers) alone should be used in Indian Agricultural practice or even that only in conjunction with them may artificials be employed, is a foolish and dangerous one highly prejudicial to the interests of the cultivator and to the welfare of India as an Agricultural country.'

May I say that I fail to see any reason for criticising these two conclusions, which appear to be quite sound, whilst I cannot agree with the trend of your later remarks on the subject. There is no possible doubt that the most advisable use of artificials is in conjunction with organic matter, but I am not aware of any evidence in this or any other country, which goes to prove that artificials judiciously applied alone may not be both beneficial and economic, or that such practice, within well-defined limits, is necessarily a bad one. I am not quarrelling with the principle which may be expressed as the English farmer would put it—'Good manuring begins with the dung', neither do I object to your statement that experimental work should aim at knowing how best to conserve the resources of indigenous manures to the best interests of Agriculture in India. But to convey the impression that work on *exogenous* fertilizers is in any way complete or conclusive, is definitely propagating something which is untrue.

In my work in India it has been necessary to pay a great deal of attention to manuring practices and advances in the use of artificial fertilizers. In my own opinion research work on fertilizers on sufficiently systematic lines to be statistically significant must be admitted to be extremely small.

I have before me now two specific cases, in which further knowledge is needed regarding factors which may well be concerned in the lowering of production costs to the cultivator. The first of these deals with Ammono-phos, the ammonium phosphate fertilizer, which, whilst also providing soluble N and P₂O₅ and giving in practice as good results as Sulphate of Ammonia and Super, is refused official recognition owing to the fact that as yet no official experiments have been undertaken by the Madras Agricultural Department to put the comparison to a practical test. As far as I am aware, the only really comparative trials of fertilizers on paddy at present in progress here, are the Maruter experiments, and with regard to these, I think I am right in saying that the characteristics of the trials make the results which will be received of little or no scientific value.

The second case is that of Cyanamide. Whilst hundreds of thousands of tons of this fertilizer are used in other countries, and notably in paddy-growing countries, where its use enables the cultivator to increase yields, and lower costs, in South India there is not a particle of interest in the usefulness of the fertilizer. There is in India scattered evidence regarding its usefulness, and in the South, Mr. B. Viswanath's important work at Coimbatore—reported in 1928. But no effort has been made to correlate or link up the scattered evidence, and Viswanath's work on its own must be considered fragmentary, and incapable of widespread application without further support. Yet now, no work on Cyanamide goes forward, and knowledge of its usefulness on sugar-cane, plantains and other crops is completely lacking.

The impression therefore which is conveyed by your notes, that the experimental work on the usefulness of imported artificial fertilizers is already far ahead, is definitely wrong. A vast number of points need to be elucidated with a number of crops, which points are closely bound up with the prosperity of the cultivator. Such work is, in my opinion, fully as important as the question of conservation of indigenous manures, whilst I would point out, in addition, that any measures practically possible, can have but a limited effect on the quantity of such indigenous manures available to the cultivator.

I suggest to you therefore, that the remarks made by Mr. C. M. Hutchinson are perhaps not so lacking in point as your comments would lead the average reader of the *Madras Agricultural Journal* to believe, and such a view should be placed before your readers.

SHAW WALLACE BUILDINGS,
MADRAS,
July 4, 1931.

Yours faithfully,
J. E. WALKER, B. SC.

IV

Tobacco Culture

To

The Editor, Madras Agricultural Journal.

Dear Sir,

I am particularly interested in literature dealing with tobacco—its cultivation, curing and marketing. I understand that a vast acreage is under cultivation of tobacco in Coimbatore. I also learn that South India grows tobacco extensively for the European Market. I am very keen to obtain publications dealing with these matters. If you are able to assist me to get literature on these subjects, I shall feel much obliged to you. If any back numbers of your Journal deal with this subject, I shall be delighted to get them.

Awaiting your reply with keen interest,

Yours faithfully,

COLOMBO.

ALFRED M. CHITTAMBALAM.

Answer.—The following publications relating to tobacco culture, curing etc., are recommended:—

1. *The Culture of Tobacco.*—By George M. Odiam, B. Sc., Department of Agriculture, Southern Rhodesia. This is a treatise based on the survey made by the author on the tobacco industry in America. It gives exhaustive information on varieties, culture and curing.
2. *Tobacco Culture in S. Rhodesia. The harvesting and curing of Virginian tobacco.* Bull. No. 679. Department of Agriculture, Rhodesia.
3. *The Development of Tobacco Industry in S. Rhodesia.*—By D. D. Brown. Bull. No. 746. Department of Agriculture, Rhodesia.
4. *The Culture of Virginian Tobacco in S. Rhodesia.*—By D. D. Brown. Bull. No. 615. Department of Agriculture, Rhodesia.
5. *The Flue curing of Virginian tobacco in Guntur.*—By K. Sankaram Pillai. *Madras Agricultural Journal*, vol. xviii. No. 6.

V

Poison Baits for Rats and Jackals

To

The Editor, Madras Agricultural Journal.

Dear Sir,

I shall be much obliged if you can kindly let me know through the medium of your journal of any poison baits to destroy rats and jackals which do enormous havoc in sugar-cane fields in our tract.

UNJALUR, Via ERODE,
July 19, 1931.

Yours, etc.

U. M. SUNDARAM AYYAR.

Answer.—The usual remedy for jackals, rats, etc., which damage sugar-cane is one of trapping or killing with poisoned baits. Pieces of cane or banana may be split longitudinally and the inner surfaces smeared with powdered arsenic or Paris green and then the pieces closed up and tied as before. Such pieces may be left in the haunts of these pests which will get poisoned. It is better that the preparation of the poison bait is done with hands previously smeared with sugarcane juice, linseed oil or some other smelling thing since jackals and rats will easily find out the smell of human hands, suspect the traps and avoid them. Care must be taken, however, that these baits are not used by man or cattle carelessly.

COIMBATORE,
July 23, 1931.

T. V. RAMAKRISHNA AYYAR,
Government Entomologist.

VI

Manuring of Plantains

Reply to Mr. K. R. Subramania Ayyar's query regarding manuring of Plantains in the June number of the *Madras Agricultural Journal*:

When the monsoon breaks or after a thorough irrigation, the plot should be weeded and the dry leaves cut down. A heavy dose of some quick-acting manure should be applied. Groundnut cake is the best and 2 or 3 pounds of it may be applied per plant according to the fertility of the soil. The nitrogen in groundnut cake is found to be more readily available than that in other oilcakes [Vide *Year Book of the Madras Agricultural Department* 1926, pp. 85-95]. Other oilcakes and fish guano may also be used if they are cheaper. The local Agricultural Officer should be consulted regarding this point, as much depends on the variety of plantains and whether it is to be used for ripe fruits or for curry purposes only. (*Bulletin 93 of the Madras Agricultural Department.*)

College News and Notes

Games.—The activities on the games side have been more vigorous from the reopening of the College, than it was last year. The College teams have already played a number of matches in all the games and it augurs well for better luck in the several tournaments of the season. In Hockey the College team played against the Coimbatore United Club, Government College and the Combined Eleven, in the first two of which the homesters were defeated and in the third the match ended in a draw. Besides these, several practice matches were also played. Three matches in all were played in Cricket, the first two among the students themselves and the other with the officers. In the last the students won by 31 runs. With more regular practice the team may be expected to put up a better show this season. In Football also three matches were arranged, with the Government College, combined local team and the London Mission High

School. Our team lost in the first, won the second, and the third was a draw. Tennis seems to be as popular as ever, and the need for more courts is very keenly felt, particularly in view of the proposal to take in more students into the College from next year. Two of the best among the students, Danapandian and Narayanayah, played a doubles match with those in the London Mission Court. Though the youngsters lost the match, it is hoped more matches of this sort would be arranged in the future. Volley Ball is getting equally prominent, two interesting matches having been played, one with the Y.M.C.A., and the other with the Government College.

The Ladies' Club.—The Fancy Sale in aid of the Club Building Fund came off on 18th July in the Freeman Hall. Mrs. Nightingale opened the Sale which proved to be an unqualified success. A pleasing feature of the Sale was the great interest evinced by the ladies of the Estate, many of whom had made valuable contributions by way of useful articles of their own handiwork. Among the articles on sale were children's clothing, household articles, toys, pictures, preserves, honey, vegetables, fruits, etc. The side shows included a 'lucky dip', a 'horse race' and a tea stall. The function was a grand success and it is understood that about Rs. 350 was realised as profit. There were also a large number of visitors from the town, including officials and ladies.

The Association of the Upper Subordinate Officers.—An extraordinary general body meeting of the members on the Estate was held on the 15th April last and a representation was sent to the Government in connection with the issue of G.O. No. 314, Public Services, published in the *Fort St. George Gazette* of the 7th April 1931, according to which the L. Ag.'s and the B.Sc. Ag.'s are ineligible for appointments to the Gazetted ranks of the Scientific Sections. The Government have since replied to the effect that the subject-matter of the letter is under their consideration. Two other meetings were held in July and the body decided upon sending the following: (1) Memorial to Government embodying the grievances already included in the previous memoranda but not yet redressed. (2) Memorandum with reference to the penalties imposed upon upper subordinates who fail to get through the Account Test within the prescribed time. (3) Memorandum regarding the selection of candidates for study leave, ordinary leave, scholarships and deputation for study abroad or in India and for liberalising the rules for the grant of study leave to upper subordinates. (4) Memorandum to the President, Estate Committee, representing certain grievances of the members in regard to allocation of quarters to them on the Estate. Members in the districts are requested to send in their subscriptions (Re. 1) for the current year, 1931-32, at an early date to the Secretary.

M.A.S.U. Parliament.—The second meeting of the M.A.S.U. Parliament came off on the 23rd July when Rao Bahadur M. R. Ramaswami Sivan acted as speaker of the house. Rao Bahadur B. V. Nath moved that the export of indigenous manures from India was not conducive to the welfare of the country. Mr. E. C. Wooton, B. Sc., Chemist of T. Stanes & Co., opposed the motion. From the large attendance and the sustained and keen discussion it was a great success.

Association of Economic Biologists.—A meeting of the association of Economic Biologists was held in the Freeman Hall on the 22nd July. Two papers were presented to the meeting, viz., Studies on the Sugarcane Pollen by Messrs. N. L. Dutt and M. K. Krishnaswami, and the Role of the protoplasmic pigments of plants by Dr. T. R. Seshadri.

Accounts Test for Agricultural Officers.—We have received communications drawing attention to the 'wide and rambling nature of the afternoon paper' in the recent examination held on 27th July. Questions IV and V are about portions which have not yet been incorporated into the Departmental Manual by the issue of correction slips, and there is a widespread feeling that it is not fair to ask questions outside the prescribed portions, especially when the fate of many probationers depends on passing this test.

Board of Studies in Agriculture.—A meeting of the University Board of Studies in Agriculture was held on the 22nd July. In the unavoidable absence of Mr. C. Tadulingam, Rao Bahadur M. R. R. Sivan presided over the meeting. Among the members present were Mr. I. Raman Menon, Director of Agriculture, Cochin, Mr. V. Krishnamurti Ayyar, Principal of the Madras Veterinary College, and Rao Bahadur M. R. Ramaswami Sivan.

Retrenchment.—The Retrenchment axe has begun to function even on the Agricultural Budget. The allotment for Europe Stores was the first item to be cut by 50 per cent and it is rumoured that more cuts are in store for the Department and that the cut from the total budget may amount to more than 8 per cent.

Oil Seeds Specialist.—It is understood that orders from Government have been received to the effect that the Agricultural Research Station, Palakuppam, and the Coconut stations on the West Coast should be handed over with their respective staff to the Oil Seeds Specialist.

Scouting.—A meeting of the residents of the Agricultural Colony was held on July 24 to concert measures for reviving scouting activities among the boys on the Colony. A committee was formed with Rao Bahadur T. S. Venkatraman as President, Rao Bahadur B. V. Nath as Vice President, Mr. M. R. Balakrishnan as Secretary and a committee of 8 members to give impetus to the movement. The boys are now well up in the various scout tests and an investiture ceremony for presenting them the badges will be held early in August.

Visitors.—Mr. H. St. C. Gilby, Assistant Director of Survey, Cannanore, and Mrs. Gilby visited the Agricultural College on July 17. Mr. Mayuranathan, B.A., Herbarium Assistant at the Madras Museum, was on a short visit to the Herbarium to identify some of the botanical collections in the Museum. Mr. A. B. Shetty, M.L.C., Honorary visitor of the Agricultural College, visited the College Research Institute and the Agricultural Stations on July 8.

Students' excursions.—The students of the Agricultural College are going out regularly on excursions for rural enquiry into several villages round about Coimbatore. The II year B.Sc. Class visited the Y.M.C.A. Rural centre at Ramanathapuram with their lecturers to acquaint themselves with Apiculture.

The Principalship.—Mr. C. Tadulingam, Principal of the College who was on long leave, returned to duty and took charge of his office on the 12th of August from Mr. R. C. Broadfoot who though originally transferred as Deputy Director of Agriculture, VI Circle, has since been posted as Cotton Specialist.

SUGARCANE SORGHUM HYBRIDS

AN APPEAL FOR SEEDS OF WILD SORGHUM

Having raised inter-generic hybrids between the sugarcane (P. O. J. 2725) and sorghum (*Sorghum Durra*, Stapf) for the last two seasons—over 75,000 in number—and having secured in the hybrids undoubted evidence of their hybrid nature, the time would appear to have arrived for fully developing this work.

The chief use for this hybridisation would appear to lie in the possibility of breeding short-duration canes. Seven hundred hybrids planted out during the first season have yielded half a dozen types maturing in six months and with satisfactory juice. One direction, however, in which they could be improved with advantage is in the matter of tonnage. In future crossings it is proposed to use as parents on the sugarcane side not only canes more vigorous in growth than P.O.J. 2725 but also various forms of vigorous growing *Saccharum spontaneum*, of which a certain number are available at Coimbatore.

It is now desired to secure a collection of wild sorghums to try and introduce vigour—i.e. tonnage—from the sorghum side also. The undersigned will feel highly indebted to persons or institutions that would kindly favour him with such seeds. Through the kindness of the authorities in the U. S. A. and Hawaii, a fair collection of the sweet or 'honey' sorghums has been secured. The seeds now desired are of wild sorghums with plenty of vegetative vigour and good tillering. All such help will be gratefully acknowledged in future publications.

T. S. VENKATRAMAN,
Government Sugarcane Expert,
Lawley Road Post (Via Coimbatore, South India).

THE RAMASASTRULU-MUNAGALA PRIZE AWARD, 1931

In the Ramasastrulu-Munagala prize competition for the year 1931, the prize which is in the form of a gold medal has been awarded by a committee of three judges to Mr. C. Jaganatha Rao, B.A., Assistant to the Cotton Specialist, Nandyal, for his paper on 'The effect of time of planting on some economic characters of the Cotton Plant'.

K. M. THOMAS,
Secretary.

Weather Review

JULY 1931.

Rainfall data

Division	Station	Actual for month	Departure from normal	Total since January 1st	Division	Station	Actual for month	Departure from normal	Total since January 1st
Circars ...	Gopalpore ...	3.6	- 2.5	5.7	South ...	Negapatam...	0.3	- 1.6	13.7
	Vizagapatam.	4.0	- 0.4	10.8		Madura ...	2.4	+ 0.6	6.9
	Cocanada ...	9.4	+ 3.0	15.2		Pamban ...	0.1	- 0.8	?
	Masulipatam	4.5	- 1.7	?		Palamcottah..	nil	- 0.3	1.4
Ceded Districts.	Kurnool ...	2.4	- 2.4	9.6	West Coast	Trivandrum..	6.6	- 0.8	28.2
	Bellary ...	0.4	- 1.3	4.2		Cochin ...	26.2	+ 2.9	68.2
	Anantapur ...	0.4	- 1.8	5.0		Calicut ...	27.9	- 0.9	61.7
	Cuddapah ...	4.8	+ 0.9	9.5		Mangalore ...	38.1	- 0.1	83.1
Carnatic..	Nellore ...	3.0	+ 0.4	8.1	Mysore and Coorg ...	Bangalore ...	3.4	- 3.7	9.2
	Madras ...	5.7	+ 1.9	12.4		Mercara ...	36.7	- 3.6	59.7
	Cuddalore ...	0.5	- 2.6	12.9					
Central ...	Vellore ...	10.2	+ 5.8	16.8	Hills ...	Kodaikanal ...	6.7	+ 2.4	24.8
	Salem ...	6.5	+ 2.8	11.5		Coonoor ...	4.7	+ 1.0	14.0
	Coimbatore Town ...	1.1	- 0.3	8.8					
	Coimbatore Res. Inst. ...	0.8	- 1.6	4.3					
	Trichinopoly.	2.9	+ 1.3	14.5					

General summary of weather conditions.—

The weather at the beginning of the month was disturbed at the head of the Bay and a depression had formed over the deltaic Bengal on the first. The depression moving rapidly to the west traversed Bihar and moved out beyond the range of influence over south India. Thereafter the weather was settled in the Bay.

The monsoon continued active over the West Coast almost throughout the month and extended occasionally into the interior of the peninsula during the second half of the month. Rainfall was generally normal over the whole area, except in the north of the Circars where it was 50 per cent. in defect and in the Deccan, and in excess in the central districts, where Vellore and Salem were about 50 per cent. in excess of the normal. Rainfall was generally moderate in intensity, the chief fall being 3.8 inches at Mangalore on the twentieth.

Temperatures were normal or in slight defect, the defect being noticeable in those areas where rain was frequent.

The total rainfall since the beginning of the year was much lower than at the same time last year, the difference being most marked in the South. The rainfall in Malabar was about the same. The monsoon was normally active except in the north of the Circars.

Weather report for the Research Institute Observatory :—**Summary of Observations :**

Absolute Maximum in shade	...	...	93°·5
Absolute Minimum in shade	...	...	69°·5
Mean Maximum in shade	...	...	88°·3
Mean Minimum in shade	...	...	72°·2
Total rainfall in month	...	...	0·75 inches
Mean rainfall for July	...	...	2·42 "
Departure from normal	...	...	— 1·67 "
Heaviest fall in 24 hrs.	...	...	0·22 "
Number of rainy days	...	...	4
Mean daily wind velocity	...	...	6·9 M.P.H.
Mean 8 A. M. wind velocity	...	...	6·6 "
Mean humidity	...	...	71·3 %
Total hours of bright sunshine	...	...	200·3
Mean daily hours of bright sunshine	...	...	6·46

Summary of weather conditions :

The monsoon was active at the beginning of the month with high winds and showery weather. The barometer made some rapid movements and rose by 0·122 inch in two days between the seventeenth and the nineteenth ; there was nothing to account for this movement, as the weather conditions did not change very much during this time. The monsoon thereafter was feeble and rainfall insignificant.

The rainfall was only 0·75 inch or 1·67 inches in defect, though there seems to have been moderately heavy rain in the vicinity.

Temperatures were fairly high during the month with the feeble monsoon.

P. V. R.

B. S. N.

Departmental Notifications

Gazette Notifications.—Rao Bahadur D. Ananda Rao Garu, B.Sc., Headquarters Deputy Director of Agriculture, to be in full charge of the Office of the Director of Agriculture. Mr. G. Krishnaswami Mudaliar, Lecturer in Animal Hygiene, to be Offg. District Veterinary Officer, Trichinopoly.

II Circle.—Y. Venkateswara Rao, A.A.D., Masulipatam, l.a.p. for 8 days from 20—7—31.

III Circle.—K. Hanumantha Rao, A.A.D., Rajampet, l.a.p. for 15 days from 2—7—31. M. Jeevan Rao, Probationary F.M., l.a.p. for 15 days from 17—7—31 or date of relief. M. Damodara Prabhu, F.M., A.R.S., Hagari, transfer to VII Circle.

IV Circle.—C. S. Seshagiri Ayyar, A.D., Palamanier, transfer to A.R.S. Aduturai.

VI Circle.—V. G. Dhanakoti Raju, extension of l.a.p. for one month on m.c. from 8—7—31.

VII Circle.—P. Kannan Nambiar, A.A.D., Manjeri, extension of l.a.p. for 15 days from 26—6—31. C. S. Madiar, A.D., Cannanore, l.a.p. for 4 months on m.c. from 1—8—31. The following transfers are ordered :—P. A. Kunhiraman Nambiar, A.F.M., Taliparamba, to Perintalamanna. A. Kunhikoran Nambiar to Millets Section, Coimbatore. M. Damodara Prabhu, Probationary F.M., to Taliparamba. K. M. Jacob to be A.D. Cannanore. K. Vasudeva Shenoi, A.D., Udipi, to Puttur. G. Sakharama Rao, A.D., Puttur, to Udipi.

VIII Circle.—N. Srinivasa Rao, A.D., Tirupur, l.a.p. for one month from 1—8—31. S. Ramaswami Ayyar, A.D., Palladam, l.a.p. for 16 days from 10—7—31.

G.A.C.'s Section.—T. S. Ramasubramania Ayyar, l.a.p. for 3 weeks from or after 13—7—31.

G.S.B.'s Section.—M. Rathnavelu, Sub-Assistant, l.a.p. for 11 days from 8—7—31.

Principal's Section.—P. S. Kuppuswami Ayyar, to be lecturer in Animal Hygiene, vice G. Krishnaswami Mudaliar.

D. D. L. S.'s Section.—K. Ramanujachariar Cattle Manager, l.a.p. for 3 months from 3—8—31. M. C. Menon, F.M., B.B.S., Guntur, l.a.p. for 8 days from 17—7—31 and transfer to Coimbatore, in relief of K. Ramanujachariar. A. Venkobachari, A.A.D., Kavali, l.a.p. for one month from 7—7—31 on m.c. and transfer to III Circle at his own cost.

P.S.'s Section.—S. Muthuswami Ayyar, F.M., Aduturai, transfer to Palamanier (Vellore Division).

M.S.'s Section.—P. Subrahmaniam, l.a.p. for one month from 13—7—31 and transfer to A.R.S., Nandyal.

LATEST NOTIFICATIONS

Gazette Notifications.—Mr. R. N. K. Sundaram, District Agricultural Officer, Rajahmundry, leave on average pay for two months and fifteen days with effect from the date of relief.

(1) Mr. C. Tadulinga Mudalliar, Principal, Agricultural College, Coimbatore, is permitted to return to duty before the expiry of his leave. (2) Mr. R. C. Broadfoot, Officiating Principal, Agricultural College, Coimbatore, to be Deputy Director of Agriculture, VI Circle, on relief by No. 1. (3) Mr. B. Ramayya, Deputy Director of Agriculture, VI Circle, to be Deputy Director of Agriculture, IV Circle, on relief by No. 2. (4) Mr. K. Unnikrishna Menon, District Agricultural Officer-in-charge, IV Circle, to be District Agricultural Officer, Tinnevely, on relief by No. 3. Mr. S. Sitarama Patrudu, Superintendent, Agricultural Research Station, Anakapalle, extension of l.a.p. for one month from 1—8—31. Mr. K. S. Viswanatha Ayyar, Assistant Agricultural Chemist, leave for 4 months from date of relief.

Second Circle.—K. Gurumurti, A.D., Gurzala, l.a.p. on m.c. for 3 months from date of relief.

Third Circle.—N. Annaswamy, A.D., Kadiri, l.a.p. for 1 month from 24—7—31. M. Vaidyanathan, A.D., Gooty, to be F.M., Hagari. A. Venkobachari, A.A.D., Kavali, to be A. A. D., Gooty.

P.S.'s Section.—P. Uttaman, A. R. S., Pattambi, l.a.p. for 1 month and 3 days from 29—7—31.

M.S.'s Section.—P. V. Hariharan, l.a.p. for 15 days from 21—7—31.

ERRATA

Vol. XIX, No. 7, July 1931.

Table I, page 296.

Read 'Musca nebulo' for 'Musca nebul'; delete 'do' in column 4 from Nos. 3 to 13 and insert 'mutton' in Nos. 7, 9 and 12; delete 'do' in column 5 from Nos. 5, 7, 9, 12 and 13; delete 'do' in column 6 from Nos. 6 to 12; Read 'Fb' for 'Feb' in column 2 No. 8; Read 'Anthomyiid' for 'Anthomylid' in column 2 No. 12 and read 'Anthomyiidae' for 'Anthomyliidae' in column 3 No. 12.

Table II, page 299.

Delete 'do' in column 4 against 26th November in column 1. Reference No. 4 page 299, read '(4) Howard L.O. (1911) The Housefly.' for '(4) Howard, L.'

Page 323, line 11, for 'hardened owners' read 'garden owners'.

Page 324, lines 26 and 27, for 'of canes obtained or the number of cartloads' read 'the number of cartloads of cane obtained or'.

APPENDIX

ADDITIONS TO THE LIBRARY—JUNE, 1931

A. BOOKS

1. *Genera Insectorum—Coleoptera Ade-* By Wytzman, P.,
phaga—Carabidae.
2. *A Handbook of (Systematic) Forest* .. Viswanathan, G.
Botany for Madras.
3. *Farm Motors* Potter, A. A.

B. REPORTS, ANNUAL PUBLICATIONS, Etc.

1. Report on Public Instruction in the Madras Presidency for 1929-30, Volume II, Statistics.
2. Agricultural Statistics of Bihar and Orissa for 1929-30.
3. Annual Report of the Tea Research Institute, Ceylon, for 1930.
4. Annual Report of the Department of Agriculture, Southern Rhodesia, for 1930.
5. Annual Report of the Bureau of Science, Philippine Islands, 1929.
6. Annual Report of the Agricultural Station, Turnab and Haripur, N.W. Province, 1929-30.
7. Mysore Agricultural Calendar for 1931.

C. BULLETINS, REPRINTS, etc.

8. Spontaneous Chromosome Alterations in *Crepis Tectorum* and Chromatin Mass and Cell Volume in related species—

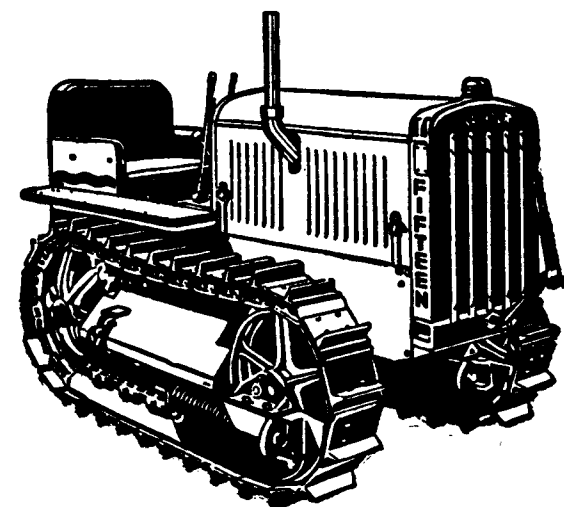
Reprint from California Publications in Agricultural Sciences—

9. Reactions of the Honey Bee to Light *Reprint from the Journal of Agricultural Research*
Volume 42 No. 7
10. A Braconid Parasite (*Apanteles Tompisoni*lyle) of the European Corn Borer. *U.S.A. Technical Bulletin* No. 233
11. Fig Insects in California *U.S.A. Circular* No. 157
12. Productions of clean milk *U.S. Farmer's Bulletin* No. 602
13. Control of the codling moth in the Pacific North West. 1326
14. Pea-nut Growing 1656
15. Winter Legumes for Green Manure in the cotton belt. 1663
16. Pine Tree Treasures—Turpentine and Rosin *Misc. Pub.* 106
17. Information for—the control of Injurious Rodents and Predatory animals. 115
18. Seasonable Hints from the Dominion Experimental Farms. *Ottawa Agricultural Department No. 50 of 1931*
19. Studies in the Veld Management—The manuring of Grass Veld. *Union of South Africa Agricultural Department Science Bulletin* No. 97

D. LEAFLETS, etc.

20. Madras Agricultural Department Quarterly Digest 31-3-31. *Madras Agricultural Department Digest* No. 91
21. Horticultural Service Experimental Garden, Ragoenan. *Java Agricultural Department Publication.*
22. The necessity and importance of seed selection in Cereals. *Cyprus Gazette* 2137 *Agricultural Supplement.* No. 31

CATERPILLAR



A Caterpillar Fifteen with a
3-furrow 42" Moldboard Plow in
Medium Black Cotton Soil
plowed 6½ acres 8" deep
in 7 hours. All in cost

Rs. 4-8 per acre.

For Information on Reducing
Costs and Improving Crops

Write to:

WILLIAM JACKS & CO.

P. O. BOX 1282, MADRAS.

CATERPILLAR

When answering our advertisers, please mention 'The Madras Agricultural Journal'.

VEGETOL SOAP

The Soap famous for its glorious lather even in hard and brackish waters. Entirely free from animal fat. Can be used even by the most orthodox priest.

Agent for Coimbatore:—

R. C. DALAL, Calicut.

If you find any difficulty in getting this soap, please drop a card to

THE KERALA SOAP INSTITUTE, CALICUT

(Makers of the well-known Insecticidal Soap for destroying green bug on coffee, mango hopper and such insect pests).

THE GOLDEN JUBILEE

number of
THE MADRAS AGRICULTURAL JOURNAL
Royal 8vo. 38 pages

A valuable book containing a retrospect of Agricultural Education in Madras from 1876-1926 besides many interesting features including 18 full page photographs neatly printed on Art paper.

Original price Re. 1-8-0

Now reduced to Re. 0-12-0

(will be sent post free on receipt of stamps worth 13 as.)

Apply: Manager, MADRAS AGRICULTURAL JOURNAL,
Agricultural College, Coimbatore,
LAWLEY ROAD, P.O.

READ THE INDIAN POULTRY GAZETTE THE OFFICIAL ORGAN OF THE INDIAN POULTRY CLUB

PUBLISHED MONTHLY

The Indian Poultry Gazette is the only Journal in India dealing only with Poultry keeping in India

Free Advice on all Matters of Poultry by the Club Expert

Join the Club and Subscribe to India's only Poultry Journal

Club Membership Subscription	...	...	...	Rs. 5 P. A.
Gazette Subscription	...	...	...	Rs. 5 P. A.

Hon. Secretary and Editor of the Gazette,
A. O. FODEN,
NARAYANGUNGE, E. BENGAL

When answering our advertisers, please mention 'The Madras Agricultural Journal'.

The Villagers' Calendar

Published Annually

BY

**THE MADRAS
AGRICULTURAL DEPARTMENT**

IN

English, Tamil, Telugu, Malayalam and Kanarese

(Jan.) (April) (March) (Sept.) (March)

It contains instructive and interesting articles on Agriculture and Veterinary Science and exhaustively deals with the work of the department including agricultural research stations, pumping and boring operations, state, loans, etc.

Price 1 anna, Postage 2 annas.

Apply to the Deputy Director of Agriculture or the District Agricultural Officer or the Agricultural Demonstrator nearest to you with three annas stamps. *Not sent by V. P. P.*

The Journal of the

Mysore Agricultural and Experimental Union BANGALORE

Published Quarterly by an Expert Board of Editors

Chief Editor: DR. B. NARASIMHA IYENGAR, B.A., Ph.D.

Subscription, Rs. 3 per annum

The Madras Journal of Co-operation

The Premier Monthly Co-operative Journal in India
Voices forth the Co-operative Opinion of the Province

Annual Subscription

Inland (including Postage)	...	Rs. 4 0
Foreign " "	...	" 4 12

Please apply to: The Madras Provincial Co-operative Union,
Royapettah, Madras.

When answering our advertisers, please mention 'The Madras Agricultural Journal'.

HOT SUN?

USE

ALMOND GLYCERINE

(a preparation in pure almond oil)

Rs. 1-4-0 per bottle of 4 oz.

OR

LEMON CREAM

(prepared in Limes & Glycerine)

Rs. 0-12-0 per bottle of 8 oz.

TRADE



MARK

Lotus Baby

Manufactured by

Toilets Manufacturing Co.,
CHITTOOR.

NOTE!

Green Manure and maintain soil fertility. Green Manuring is True Economy. It pays handsomely the cost and expenses involved.

Ground covers prevent soil erosion, preserves humidity and cuts down cost of weeding.

Shade and Wind-belt Trees attract clouds resulting in rain, yields timber for fuel and factory purposes, gives sufficient shade and helps the economical preservation of Estates.

In these days of depression, Rubber, Coconut and Tea Planters will do well to consult us for all their requirements in seeds of Green Manures, Ground Covers, Shade Trees and the like.

The Ceylon Estates Company

KALUTARA SOUTH, CEYLON

When answering our advertisers, please mention 'The Madras Agricultural Journal'.

The Indian Veterinary Journal

(The Official Organ of the All-India Veterinary Association)

This journal is the only English Veterinary Journal of its kind in India devoted to the cause of Veterinary Practice, containing standard articles on all branches of clinical veterinary medicine, surgery and kindred subjects. It also contains a review of current Veterinary Literature, and is valuable alike to veterinarians and agriculturists.

AN EXCELLENT MEDIUM FOR ADVERTISEMENT

Rates of subscription:

To members of the profession and students Rs. 4 per year

To non-members and others Rs. 8 per year

For rates of advertisement and other particulars, apply to:

THE EDITOR,

26, Wallajah Road, Mount Road P.O., MADRAS.

If You Want a Cream Separator

write for the

'STANDARD'

the last word in the

Quality and Most Sanitary Separators

'STANDARD' Cream Separator does the cleanest skimming with varied thickness of cream, runs smoothly, lubricates automatically and combines various mechanical improvements over other Separators.

Please write also for Butter Churns, Butter Workers and other Dairy requisites.

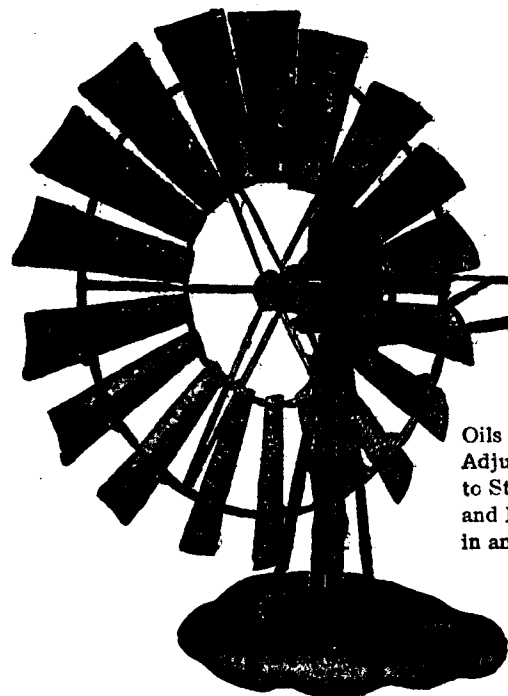
Sole Distributors:—R. N. MEHRA & Co.,

Dairymen's Providers,

DINAPORE CANTT.

When answering our advertisers, please mention 'The Madras Agricultural Journal'.

FREE POWER FOR PUMPING WATER



Wherever the Wind Blows

A CLIMAX OIL BATH WIND MILL

Affords the Cheapest Power for
Pumping Water

◆ Gives
Ample
Supply
of
Water
for all
pur-
poses
at all
times
◆

Oils itself
Adjusts itself
to Strong Winds,
and Runs Efficiently
in any wind

There is a size
for every need.

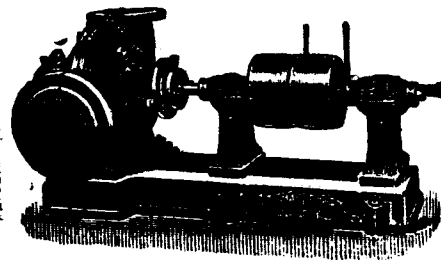
The Cost is very
Moderate.

**Many are Working
in India with
Greatest Satisfaction**

Full Particulars on Request

CLIMAX OIL BATH WINDMILL

**FOR CONTINUOUS WORK WITHOUT INTERRUPTION
INSTALL**

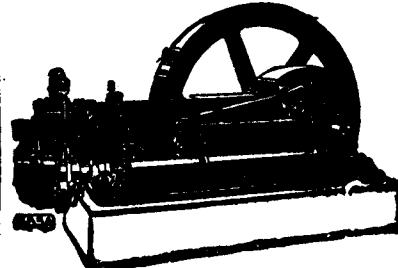


'MACBETH' CENTRIFUGAL PUMP

Specially Designed to suit Indian conditions.
Embodies all the best Modern improvements in
design, combined with simplicity of construc-
tion. Gives a large output at Low Running
Speeds and increases greatly the range of duties
for each size of Pump.

Full Particulars on Request

Our 1931
Price List
Sent on Request



Gardner Cold Starting Engine

Gives Maximum Service at Minimum Cost.
Available in all Sizes from 7 to 210 B.H.P.

Famous for Low Oil Consumption
Smooth Running and Sturdy Work.

Full Data on Request

MACBETH BROS. AND CO., LTD.
KODAK HOUSE, HORNBY ROAD, BOMBAY

When answering our advertisers, please mention 'The Madras Agricultural Journal'.

AGRICULTURE AND CO-OPERATION

CALVERT.—The Law and Principles of Co-operation. Being the Co-operative Societies Act No. II of 1912. With introduction, notes and an appendix; and Bombay Act No. VII of 1925. By H. CALVERT, I.C.S. Third Edition. Demy 8vo. Cloth. 1926. Rs. 7-8.

"Mr. Calvert in his book on 'The Law and Principles of Co-operation' with which we have dealt in a previous article, has fulfilled a most useful function in quoting passages from works on 'Practical Banking' and the like. He shows that a Credit Society is a bank in all essentials and that its safety depends on its grasp of the principles of sound banking."—*Civil and Military Gazette*.

In his third edition Mr. Calvert has appended the text of the New Bombay Act, while the special chapters on 'What is Co-operation?' and other subjects have all been retained after a revision. These are object lessons in themselves.—*Bombay Co-operative Quarterly*.

CROSTHWAITE.—Co-operation. Comparative Studies and the Central Provinces System. By H. R. CROSTHWAITE. Med. 8vo. Cloth, Rs. 6.

There is scarcely any branch of the fascinating subject of co-operation that the author fails to illuminate with some fresh fact or shrewd comment.

MUKHERJEE.—Co-operation and Rural Welfare in India. By B. B. MUKHERJEE, M.A., B.L., Professor of Economics, Government College, Muzaffarpur. Crown 8vo. Paper Boards, Rs. 3.

We welcome the book before us as symbolising the rise of a new school of thought whose aim is to do for India what Sir Horace Plunkett did for Ireland. Mr. Mukherjee has both studied and thought much regarding his subject. His remarks on the various needs of Indian rural development are sensibly and clearly expressed.

We congratulate Mr. Mukherjee on producing this well-written book and wish for him readers throughout India among our educated men and patriots.—*United India and Indian States*, 7th December, 1929.

WOLFF.—Co-operation in India. By HENRY W. WOLFF, late President of the International Co-operative Alliance. Author of 'Peoples Books', 'Co-operative Banking', etc., etc. Second Edition. Demy 8vo. Cloth, Rs. 8.

'Mr. Wolff—who, while president of the International Co-operative Alliance, played a large part in suggesting the form that legislation might take to facilitate co-operation—describes in 200 pages of this book what co-operation has done and how it is doing it.'—*Co-operative News*.

TWEED.—Cow-Keeping in India. A simple and practical book on their care and treatment, their various breeds, and the means of rendering them profitable. By ISA TWEED. 5th Edition. Revised by S. N. SINGHA, G.B.V.C., Professor of Surgery and Obstetrics, Bengal Veterinary College, Belgachia. Crown 8vo. Illustrated. Cloth, Rs. 6-8.

GILLING.—Fodder in India. A Treatise on Grasses and Crops and their characteristics and cultivation, etc. By HENRY T. GILLING, Government Grass and Dairy Farms. Crown 8vo. Limp cloth, Re. 1-4; Paper, Re. 1.

MUKERJI.—Handbook of Indian Agriculture. By NITYA GOPAL MUKERJI, M.A. Profusely Illustrated. Third Edition. Royal 8vo. Cloth, Rs. 12-8.

'It is a welcome addition to the literature on Indian Agriculture and will doubtless be of great service to those who desire to get within the compass of a single volume of moderate size, a general summary of the plant and animal industries of that vast region.'—*Bulletin of Imperial Institute*.

Full Catalogues on Application

THACKER, SPINK & CO.
P.O. Box 54, CALCUTTA

When answering our advertisers, please mention 'The Madras Agricultural Journal'.

5L
JUN 21, 1931
N31-19-8



The Madras Agricultural Journal
THE PREMIER AGRICULTURAL MONTHLY IN INDIA

A Monthly Journal in English devoted to the study and development of Agricultural Science. Contains articles of scientific as well as of general interest written in popular language. Reviews of agricultural publications, and extracts from various Journals—both Indian and Foreign—a special feature. Commands a wide circulation and an excellent medium, therefore for advertisements.

Rates of Subscription

Journal supplied *free* to Members, New Associates and Patrons of the Union.

Annual Subscription rates for others :

	Rs	A	P
India and Ceylon.	4	0	0
Foreign	...	4	8 0
...	...	0	6 0

Rates of Advertisement

		For single insertion			<i>Discounts of 12½ per cent, 20 per cent and 33½ per cent will be allowed for 3, 6 and 12 consecutive insertions of standing matter, provided space is booked ahead and prepayment made.</i>
		Rs	A	P	
For full page	...	5	0	0	
For half page	...	3	0	0	
For quarter page	...	2	0	0	

Inside cover pages 50 per cent extra.

Outside cover pages 75 per cent extra.

Preparation of blocks, unless supplied by advertisers, charged extra.

N.B.—All advertisements are subject to the approval of the M. A. S. Managing Committee before insertion. The charges are strict *payable in advance*.

Contributions to Journal

Contributions on subjects of agricultural interest or pertaining to rural economy and co-operation will be accepted for publication, subject to approval of the Editorial Board. Correspondence and queries on agricultural and allied subjects are invited. Manuscripts should be sent clearly written or typed on one side of the paper only. Contributions should be addressed to *The Editor Madras Agricultural Journal, Lawley Road P.O., S. India.*

Twenty-five copies of reprints of contributions will be presented to authors. *Extra copies and Printed covers for reprints*, if required, can be supplied at actual cost if intimation is given when the manuscript is presented

N.B.—The Editor does not hold himself responsible for the opinions expressed by the contributors.

Business communications should be addressed to :

MANAGER, M. A. S. UNION, AGRICULTURAL COLLEGE,
COIMBATORE, LAWLEY ROAD P. O.

[illegible]