
FERTILIZER EXPERIMENTS IN CULTIVATORS' FIELDS IN CEYLON

F. N. PONNAMPERUMA

(Chemist, Department of Agriculture, Ceylon)

FERTILIZER experiments in cultivators' fields, which were begun in Ceylon in 1955, were continued on an increasing scale during the past four years. Over 12,600 experimental plots were laid down at 1,642 locations during the period October 1955 to October 1959. The scope of the experiments was increased with each successive season and to date has included the following kinds of trials :—

1. forms of nitrogen ;
2. forms of phosphate ;
3. top dressing with ammonium sulphate ;
4. N, P ;
5. complex N, P, K ;
6. simple NPK treatment comparisons ;
7. liming ;
8. trace elements ;
9. silica.

The methods and organization of the scheme of fertilizer experimentation in cultivators' fields and results up to August 1958 were published in Vol. VIII, No. 1 of the International Rice Commission News letter. This paper reports briefly the conclusions of the trials up to August 1958, and the results of the subsequent experiments up to April 1959.

1. FORMS OF NITROGEN TRIALS

1.1 October 1956–March 1957

A 3×3 factorial experiment replicated at 14 locations in a Range in the wet zone where the soils were imperfectly to moderately well drained strongly acid lateritic clays and loams showed that during this season :

- (a) ammonium sulphate was superior to urea and ammonium nitrate ;

- (b) the differences between urea and ammonium nitrate were not significant; and
- (c) the response to nitrogen was linear in the range 0-60 lb. N per acre and averaged 9 lb. of paddy per lb. of N.

1.2 October 1957-March 1958

During this season of unusually heavy rainfall and severe floods, four-plot trials at 38 locations revealed no response to nitrogen at 40 lb. N per acre over a basal dressing of 40 lb. P_2O_5 and 50 lb. K_2O per acre nor differences among ammonium sulphate, urea, and ammonium nitrate.

1.3 October 1958-March 1959

Object: to study the response of rice to ammonium sulphate, urea, ammonium nitrate and ammonium phosphate (16-20 grade adjusted with ammonium sulphate and rock phosphate) at 40 lb. N per acre over a basal dressing of 40 lb. P_2O_5 as rock phosphate and 50 lb. K_2O as muriate of potash.

Design: Randomized blocks of five plots replicated at several locations in each Range permitting analysis of results Rangewise or by zone.

Results:

TABLE 1-1
Mean Yields of Paddy in lb./acre

Zone	Soils	No. of locations	Control	Ammon. Sulph.	Urea	Ammon. Nitrate	Ammon. Phosph.	S.E.
Dry zone ..	Well drained neutral, grey loams and clays	19	1,183 100	3,599* 113	3,706** 116	3,375 106	3,690** 116	106 (%)
Mid-country wet zone	Moderately well drained brown acid loams	35	2,506 100	2,870* 115	2,700* 108	2,718* 109	2,871** 115	53 (%)
Low-country wet zone	Imperfectly drained brown acid clays and loams	28	1,285 100	1,442 112	1,639* 128	1,573* 122	1,717* 134	66 (%)

*Significant at 5% level.

**Significant at 1% level.

Conclusions :

DRY ZONE. All nitrogenous fertilizers except ammonium nitrate gave significant increases in yield. The mean response to 40 lb. N in the form of ammonium sulphate, urea, and ammonium phosphate (among which there were no significant differences) was 482 lb. paddy per acre.

MID COUNTRY WET ZONE. All forms of N gave significant increases in yield over the no-nitrogen control. Ammonium sulphate and ammonium phosphate significantly outyielded urea and ammonium nitrate. There was no significant difference between ammonium sulphate and ammonium phosphate nor between urea and ammonium nitrate. The mean response to 40 lb. N as ammonium sulphate and ammonium phosphate was 365 lb. paddy per acre.

Low COUNTRY WET ZONE. All forms of N except ammonium sulphate gave significant increases in yield. The mean response to 40 lb. N in the form of ammonium nitrate, urea, and ammonium phosphate was 358 lb. paddy per acre.

1.4 April-September 1959 trials

The following nitrogenous fertilizers were tested at 40 lb. N per acre over a basal dressing of 40 lb. P_2O_5 per acre as rock phosphate and 50 lb. K_2O per acre as muriate: ammonium sulphate, urea, ammonium nitrate, ammonium sulphate nitrate, and ammonium phosphate (16-20 grade adjusted with ammonium sulphate and rock phosphate). The results are shown in Table 1.2.

TABLE 1.2
Mean yields in lb./acre

Zone	Soils	No. of locations	Control	Amn. sulph.	Urea	Amn. nitrate	Amn. Sulph. nitrate	Amn. Phosph.	S.E.
Dry Zone	Grey neutral clays and loams	24	2,234 100	** 2,795 125	** 2,854 128	** 2,719 122	** 2,599 116	** 2,712 121	50 (%)
Mid-Country wet zone	Brown acid loams	12	** 2,222 100	** 2,727 123	** 2,864 129	** 2,741 123	** 2,862 129	** 3,012 136	61 (%)
Low-country wet zone (Kalawana)	Brown strongly acid loams	6	1,207 100	1,312 109	1,440 119	* 1,531 127	* 1,581 131	1,679 139	95 (%)

*Significant at 5% level.

**Significant at 1% level.

Conclusions :

DRY ZONE. All forms of N gave significant increases in yield over the no-nitrogen treatment. Ammonium sulphate nitrate was significantly inferior to ammonium sulphate, urea, ammonium nitrate and ammonium phosphate, among which there were no significant differences. The mean response to 40 lb. N per acre in these four forms was 536 lb. of paddy per acre.

MID COUNTRY WET ZONE. All forms of N yielded significant responses. Ammonium phosphate significantly out-yielded the others. The mean response to 40 lb. N as ammonium phosphate was 790 lb. paddy per acre.

LOW COUNTRY WET ZONE. (KALAWANA). All forms of N except ammonium sulphate gave significant increases in yield. The mean response to 40 lb. N as ammonium nitrate, ammonium sulphate nitrate and ammonium phosphate was 390 lb. paddy per acre.

1.5 General Conclusions :

The results of these trials show that the responses to the forms of N vary with the soil, zone, and season.

In the dry zone there were no significant differences among ammonium phosphate, urea, and ammonium sulphate; these forms of nitrogen were superior to ammonium nitrate and ammonium sulphate nitrate. In the mid country wet zone ammonium phosphate gave a higher response than ammonium sulphate, urea, ammonium nitrate and ammonium sulphate nitrate. In the low country wet zone ammonium sulphate was inferior to the other forms of nitrogen. Ammonium phosphate appears to be the best.

The responses to 40 lb. N per acre in the presence of 40 lb. P_2O_5 and 50 lb. K_2O per acre ranged from 358-790 lb. paddy per acre.

2. FORMS OF PHOSPHATE TRIALS**2.1 April-September 1959 Trials**

There were no significant differences among the phosphatic fertilizers, soft rock phosphate, ordinary superphosphate, concentrated superphosphate, basic slag and bone meal (3/32" grade) at 40 lb. P_2O_5 per acre over a basal dressing of 200 lb. per acre ammonium sulphate and 100 lb. per acre muriate of potash. The mean responses to 40 lb. P_2O_5 per acre was 501 lb. per acre paddy.

The soils in six of the eight locations at which this experiment was carried out were well drained, neutral, non-lateritic loams.

2.2 October 1957-March 1958 Trials

The forms of phosphate trials replicated at eighty-five locations in the wet zone on acid and strongly acid moderately well drained to poor drained lateritic loams and clays revealed no significant differences among soft rock phosphate, ordinary superphosphate, concentrated superphosphate, basic slag, and bone meal.

During this season of unusually heavy rainfall the responses were significant only on the acid, moderately well drained soils of the mid country. The mean response in the mid country was 563 lb. paddy per acre to 40 lb. P_2O_5 per acre.

3. TOP DRESSING TRIALS WITH AMMONIUM SULPHATE

Top dressing alone with ammonium sulphate 30 days before heading of the relatively productive well drained, neutral, non-lateritic clays and loams under the major Irrigation Schemes at eighteen locations in the dry zone gave a mean response of 543 lb. paddy per acre to 100 lb. ammonium sulphate and a further increase of 229 lb. per acre to 200 lb. ammonium sulphate per acre.

These trials were carried out during the season April-August 1957.

4. N, P TRIALS

4.1 April-September 1957 Trials

The responses of rice to 0, 40, 80 lb. N per acre as ammonium sulphate and 0 and 40 lb. P_2O_5 per acre as concentrated superphosphate over a basal dressing of 100 lb. per acre muriate of potash was studied in a 3×2 factorial experiment replicated at eight locations on neutral non-lateritic loams in the dry zone.

The average responses were 327 lb. paddy per acre to 40 lb. N per acre, and a further 200 lb. of paddy to 80 lb. N per acre. The average response to 40 lb. P_2O_5 per acre was 322 lb. paddy per acre.

4.2 October 1957-March 1959 Trials

The same trial was laid down at fifty six locations on acid to strongly acid lateritic soils in ten districts in the wet zone.

During this season of exceptionally heavy rainfall the response to nitrogen was not significant in any of the ten districts. The response to 40 lb. P_2O_5 per acre was significant only in the mid country, as in the form of phosphate of the same season, and averaged 506 lb. paddy per acre.

5. COMPLEX N, P, K TRIALS

These trials were set down to determine the optimum combination of N, P, K for each District and, if possible, for each Range.

The levels were :

N—0, 30, 60 lb. N per acre as ammonium sulphate

P—0, 20, 40 lb. P_2O_5 per acre as rock phosphate

K—0, 50 lb. K_2O per acre as muriate of potash.

The response of rice to 14 of the 18 possible combinations of N, P, K were studied in 5 "blocks" of 6 plots each set down at random within each Range. The results are summarized in Table 5.1.

TABLE 5.1
Results of Yala 1958 N, P, K Trials

District	No. of "blocks" (locations)	Con- trol lb. acre	Mean responses in lb. per acre to					Opti- mum combi- nation
			N ₁	N ₂	P ₁	P ₂	K ₁	
Kandy ..	25 ..	1,726	**	**	*	**	121	N ₁ P ₂
Kegalle ..	15 ..	1,741	91	125	10	90	197*	K ₁
Ratnapura ..	20 ..	982	207**	255**	185**	320**	35	N ₁ P ₂
Colombo-Kalu- tara-Galle ..	25 ..	1,496	76	102	95	147	30	—
Kurunegala ..	15 ..	1,453	178*	202*	52	73	35	N ₁
Hambantota ..	15 ..	2,198	408**	508**	248*	68	236*	N ₁ P ₁

* Significant at 5% level.

** Significant at 1% level.

6. SIMPLE N, P, K TRIALS

The complex N, P, K trials of the proceeding section imposed a heavy burden on the Range Officers. Besides, the loss of even a block through flood, drought, insect or cattle damage made the statistical analysis difficult and also detracted considerably from the value of the experiment. The N, P, K trials were therefore simplified to a test of eight or nine combinations of three levels of N and P, and two of K. These treatment combinations were based on the observations that: (i) Ceylon rice soils generally respond to both N & P; (ii) the optimum combination of levels of N & P varies with the zone and soil type; and (iii) potassium is relatively unimportant on most rice soils of Ceylon.

6.1 Simple —Plot N, P, K Trials

Design : Randomized block of 8 plots replicated at locations.

Treatments : (1) Control (no fertilizers) ; (2) N_1P_1 ; (3) $N_1P_1K_1$; (4) N_1P_2 ; (5) N_2P_1 ; (6) $N_2P_1K_1$; (7) N_2P_2 ; (8) $N_2P_2K_1$.

N_1 = 30 lb. N per acre as ammonium sulphate

N_2 = 60 lb. N per acre as ammonium sulphate

P_1 = 20 lb. P_2O_5 per acre as rock phosphate

P_2 = 40 lb. P_2O_5 per acre as rock phosphate

K_1 = 50 lb. K_2O per acre as muriate of potash

Season : October 1958–March 1959

Results :

TABLE 6-1

Mean yields of Paddy in lb./acre

Zone	Soils	Locations	Control	N_1P_1	$N_1P_1K_1$	N_1P_2	N_2P_1	$N_2P_1K_1$	N_2P_2	$N_2P_2K_1$	S.E
Dry Zone	Grey neutral clays and loams	18	2,909	3,432	3,381	3,483	3,335	3,330	3,082	3,482	86
Mid-country wet zone	Brown acid loams ..	15	2,145	2,566	2,714	2,682	2,837	2,836	2,717	2,532	69
Low-country wet zone	Brown strongly acid clays and loams	15	1,224	1,581	1,558	1,748	1,577	1,563	1,512	1,640	74

Conclusions :

DRY ZONE NEUTRAL GREY LOAMS & CLAYS. All treatments except N_2P_5 gave highly significant increases in yield over the unfertilized control. N_1P_1 gave a highly significant increase of 521 lb. paddy per acre or 18 per cent over the control.

MID COUNTRY WET ZONE BROWN, ACID LOAM. All treatments gave highly significant increases in yield over the unfertilized control. N_2P_1 gave an increase of 694 lb. paddy per acre or 32 per cent over the control.

LOW COUNTRY WET ZONE. All treatments gave significant increases in yield. N_1P_1 gave an increase of 357 lb. paddy per acre or 29 per cent over the unfertilized control.

6.2 Simple 9—Plot N, P, K Trials

These trials were similar to those of the preceding section except that an additional treatment, viz, $N_1P_2K_1$, was included. The levels of N, P, & K were the same as in 6.1.

Design: Randomized blocks of 9 plots replicated 6 times in each Range.

Season: April–September 1959.

Results:

TABLE 6.2
Mean Yields of Paddy in lb./acre

Range	Control	N P 1 1	N P 1 1 K 1	N P 1 2	N P 1 2 K 1	N P 2 1	N P 2 1 K 1	N P 2 2	N P 2 2 K 1	S.E.
1. Hamban tota ..	3,729	4,332**	3,918**	4,189**	4,337	3,937	3,768	4,123**	3,860	109
2. Hungama ..	1,509	2,071**	2,119**	1,902	2,163**	2,199**	2,270**	2,383**	2,203**	139
3. Bellatta ..	2,292	2,681**	2,659**	2,659**	2,650**	2,731**	2,689**	2,719**	2,793**	78
4. Embilipitiya ..	2,502	3,084*	2,930	3,288**	2,976*	3,320**	3,081*	3,359**	3,531**	172
5. Talpotha ..	3,416	3,796	3,806	3,798	3,612	4,039	3,387	3,672	3,506	185
6. Killinoch ..	1,299	2,682**	1,911**	2,453**	2,434**	3,052**	3,061**	2,189**	2,467**	150
7. Matale South	2,621	3,325	3,135	3,086	3,213	2,953	3,169	3,087	3,201	137
8. Tumpana	2,665	2,816	2,781	2,874	2,739	2,908	2,697	2,779	2,615	51
9. Yati-Nuwara-Udu	1,473	1,819	2,610	1,976	2,102	1,923	2,190	2,047	2,156	197
10. Pataba-Dumbara ..	2,958	3,482	3,548	3,416	3,331	3,469	3,365	4,191*	3,868	220
11. Mawanella ..	3,433	3,856	3,366	3,689	3,410	3,852	3,602	3,812	3,653	220
12. Kolonne	2,067	2,695*	2,740*	2,750*	2,293	2,487	2,388	2,706*	2,778*	210
13. Alawwa	2,556	2,596	2,840	2,906	2,864	3,093*	3,146*	2,868	2,999*	139
14. Piliyandala ..	1,296	1,464	1,745	1,804	1,676	1,474	1,425	1,484	1,315	123
15. Horana	1,528	1,681	1,844	1,748	1,738	1,873	1,790	1,688	1,720	90
16. Horagolla ..	1,721	1,907	1,897	1,937	2,138	1,775	2,070	2,177	1,994	180
17. Kalutara	1,389	1,630*	1,725*	1,726*	1,613*	1,652*	1,602*	1,567	1,684*	72
18. Matugama ..	1,885	2,198*	1,914	2,078	2,299**	2,230*	2,415**	2,009	2,109	113
19. Kalawana ..	1,270	1,575	1,227	1,429	1,659	1,606	1,548	1,559	1,565	152

Range No. Soils

1. Grey, neutral to slightly alkaline clays.
2. Grey, saline, slightly alkaline clays.
- 3-5. Grey, neutral loams.
6. Grey, sandy loams.
- 7-12. Brown, acid loams.
- 13-19. Brown, strongly acid clay loams.

FERTILIZER EXPERIMENTS IN CULTIVATORS' FIELDS IN CEYLON

Conclusions :

TABLE 6.3

Range	Best Treatment lb./acre						Increase over control	
	N	P ₂ O ₅	K ₂ O				lb./acre	%
1. Hambantota ..	30	20	—				651	17.7
2. Hungama ..	60	20	—				690	45.9
3. Beliatta ..	30	20	—				389	16.7
4. Embilipitiya ..	60	40	—				857	34.3
5. Talpotha ..	—	—	—				—	—
6. Kilinochi ..	60	20	—				753	57.9
7. Matale South ..	30	20	—				704	26.8
8. Tumpane ..	—	—	—				—	—
9. Yatinuwara-Udunuwara ..	30	20	50				1,137	77.7
10. Pata Dumbara ..	60	40	—				1,233	41.7
11. Mawanella ..	—	—	—				—	—
12. Kolonne ..	30	20	—				628	30.4
13. Alawwa ..	60	20	—				537	21.0
14. Piliyandala ..	—	—	—				—	—
15. Horana ..	—	—	—				—	—
16. Horagolla ..	—	—	—				—	—
17. Kalutara ..	30	20	—				241	17.3
18. Matugama ..	30	40	50				414	21.6
19. Kalawana ..	—	—	—				—	—

The response to fertilizers was good on the grey neutral soils of the dry zone and the brown, acid soils of the mid country wet zone ; it was poor on the brown, strongly acid soils of the low country wet-zone. There was a response to potassium in only two of the 19 Ranges.

7. LIMING TRIALS

The marked and sustained responses to lime at the Rice Research Station, Panagoda, prompted the extension of liming trials to cultivators' fields. The results are summarized below.

7.1 Lime and Nitrogen Trials (October 1957)

A 2 × 2 experiment with slaked coral lime at 0 & 6 tons per acre and N at 0 and 40 lb. per acre as ammonium sulphate over a basal dressing of 40 lb. P₂O₅ & 50 lb. K₂O per acre replicated at 13 locations on the strongly acid lateritic soils in the Mirigama Range showed that :

- (i) the mean response to 6 tons per acre lime in the absence of nitrogen was 920 lb. of paddy per acre ;

- (ii) there was no response to nitrogen ; and
- (iii) lime alone was better than lime with nitrogen.

The mean yields in lb./acre are given below—

L_0N_0	L_1N_0	L_0N_1	L_1N_1	<i>S. E.</i>
1,868	.. 2,788	.. 2,010	.. 2,452	.. 83

The same experiment on a similar soil type at 6 locations in Kamburupitiya Range showed a response of 382 lb. paddy per acre to 6 tons of slaked lime per acre. The mean yields were—

L_0N_0	L_1N_0	L_0N_1	L_1N_1	<i>S. E.</i>
1,697	.. 2,111	.. 1,734	.. 2,079	.. 78

7.2 Residual Effects of Lime

Repetition of the trials in Kamburupitiya during the subsequent season, i.e., April 1958, revealed a response of 486 lb. paddy per acre to 6 tons per acre lime applied in October 1957. Continuation of the Mirigama trials in October 1958 (one year after liming) revealed a significant response of 322 lb. per acre paddy to the original 6 tons per acre slaked lime. During this season the response to lime applied in October 1957 in Kamburupitiya was a non-significant (5 per cent level) increase of 280 lb. per acre paddy.

7.3 Lime and Phosphate Trials

A 3×2 lime and phosphate trial with lime at 0, 3, 6 tons slaked lime per acre and at 0 & 40 lb. P_2O_5 as rock phosphate in Mirigama revealed no response to lime or P during the very wet season of April–September, 1958.

Continuation of these trials at 10 locations in October, 1958 revealed a significant response of 207 lb. paddy to 3 tons per acre slaked lime but no response to phosphate on the average.

A fresh 3×2 experiment in October 1958 in the same Range with 0, 4 and 8 tons per acre ground coral limestone and 0 and 40 lb. per acre P_2O_5 as rock phosphate revealed responses of 460 and 657 lb. paddy per acre to 4 and 8 tons per acre ground limestone respectively. There was no response to phosphate nor a lime $\times$ phosphate interaction. The mean yields in lb/acre are shown below—

L_0P_0	L_1P_0	L_0P_1	L_1P_1	L_2P_0	L_2P_1	<i>S.E.</i>
2,074	.. 2,473	.. 1,911	.. 2,413	.. 2,703	.. 2,596	.. 94

7.4 Forms of Lime Trials (October 1958)

Three forms of lime, viz., slaked coral lime, ground coral limestone and ground dolomite were tested at a lime equivalent of 6 tons per acre slaked lime in 14 locations on the strongly acid lateritic rice soils of the Mirigama Range. The responses to slaked coral lime, ground coral limestone and dolomite were 707, 486, and 319 lb. paddy per acre respectively. The mean yields are shown below—

	No lime	Slaked coral lime	Ground coral limestone	Ground dolomite	S.E.
Mean yield (lb./acre)	.. 2,445	.. 3,151**	.. 2,930**	.. 2,764**	.. 72

7.5 Levels of Lime Trials

Four levels of lime, viz., 0, 2.7, 5.4, and 8.1 tons per acre ground limestone were tested in several ranges in October 1958-March 1959. The results are summarized district-wise in Table 7.1.

TABLE 7.1
Mean Yields of Paddy in lb./acre

District	No. of locations	Ground limestones in tons/acre				S.E.	Optimum lime level tons/acre	Response lb./acre
		0	2.7	5.4	8.1			
Kandy ..	25	2,189	2,723**	2,856**	2,992**	103	2.7	534
Kegalle ..	14	2,916	3,236*	3,281*	3,280*	90	2.7	320
Ratnapura ..	14	1,780	2,104	2,115	2,328*	145	8.1	548
Colombo ..	17	1,503	1,726*	1,850**	1,957**	54	5.4	347
Kalutara ..	15	1,390	1,594	1,565	1,594	76	—	—

Conclusions :

The response to lime was highest on the strongly acid lateritic soils of Mirigama. Here slaked lime at 6 tons per acre gave an increase of 920 lb. paddy per acre. The residual effect of lime one year later averaged 322 lb. paddy per acre.

In Mirigama Range both nitrogen and phosphatic fertilizers appeared to be superfluous in the season of liming.

The response to lime was variable. It was most marked on the strongly acid soils of Mirigama Range appreciable in the mid country and least in the Kalutara District. The responses were linear in the range 0-8.1 tons per acre ground limestone on the strongly acid soils of Mirigama, and Colombo and Ratnapura Districts. It was quadratic in this range in the less strongly acid soils of Kandy and Kegalla Districts. In the last two districts the optimum level was 2.7 tons per acre ground limestone.

8. TRACE ELEMENT TRIALS

Object : To study the response of rice to all and each of four trace elements in the presence of the others over a basal dressing of 40 lb. N, 40 lb. P_2O_5 and 50 lb. K_2O per acre.

Design : Randomized block of 6 plots replicated at six random locations in each Range.

Treatments :

1. Control (no trace elements)
2. All four trace elements (Cu, B, Zn, Mo)*
3. Minus Cu
4. Minus B
5. Minus Zn
6. Minus Mo

Rates : Cu=10 lb. per acre copper sulphate.

B =10 lb. per acre borax

Zn=10 lb. per acre zinc sulphate

Mo= 1 lb. per acre sodium molybdate.

Season : April to September, 1959.

Results :

TABLE 8.1
Mean Yield in lb./acre

Range	Control	All	Minus		Minus		S. E.
			Cu	B	Zn	Mo	
Kosgama	.. 1,723 ..	1,722	.. 1,548 ..	1,676	.. 1,687 ..	1,588	.. 139
Piliyandala	.. 2,089 ..	2,492*	.. 2,326 ..	2,364	.. 2,582*	2,438*	.. 109
Kolonne	.. 2,496 ..	2,889	.. 2,440 ..	2,579	.. 2,681 ..	2,502	.. 130
Hambantota	.. 3,394 ..	3,936*	.. 3,095 ..	4,229**	.. 3,068 ..	3,447	.. 190

Conclusions :

KOSGAMA. There was no response to trace elements.

PILIYANDALA. The pattern of yields suggests that the significant responses are to Cu and B.

KOLONNE. There is an appreciable though non-significant (5 per cent level) response to the four element treatment. There is a suggestion of the need for Cu.

HAMBANTOTA. There is a highly significant response to the combination of Cu, Zn, Mo. The pattern of responses points to a depressing effect of B. On these alkaline clays the level of boron may already be too high.

9. SILICA TRIALS

The low country wet zone strongly acid lateritic soils are deficient in silica. Silica trials were therefore set down in seven Ranges in October, 1959 in the wet zone. Silica was supplied in the form of Portland cement. Field observations suggest a marked response to silica. The trials are in progress.

10. GENERAL SUMMARY AND DISCUSSION

Fertilizer trials in cultivators' fields in Ceylon have yielded useful results.

They have shown that :

- (i) ammonium sulphate, urea and ammonium phosphate are equally good sources of nitrogen on the grey non-lateritic soils of the dry zone ;
- (ii) ammonium phosphate is the best form of nitrogen on the brown acid and strongly acid lateritic soils of the wet zone ;
- (iii) there are no significant differences among concentrated superphosphate, ordinary superphosphate, rock phosphate, basic slag, and bone meal ;
- (iv) the response to 40 lb. N in the presence of 40 lb. P_2O_5 and 50 lb. K_2O per acre ranged from 358-790 lb. paddy per acre ;

- (v) the optimum combination of fertilizers under current conditions are 30-60 lb. N and 20 lb. P_2O_5 for the grey non-lateritic soils of the dry zone, 30-60 lb. N and 40 lb. P_2O_5 for the brown acid lateritic soils of the mid-country wet zone, and 30 lb. N and 20 lb. P_2O_5 on the strongly acid lateritic soils of the low country wet zone ;
- (vi) responses to potassium at 50 lb. K_2O per acre are rare ;
- (vii) there is a marked response to lime on certain strongly acid lateritic soils of the low country and the acid lateritic soils of the mid-country wet zone.

The responses to fertilizers were highest in the dry zone and mid-country wet zone and least in the low-country wet zone. The yields in the dry zone and mid-country wet zone would undoubtedly have been considerably higher had good seed and improved cultural practices been uniformly used.

These trials have also indicated the areas where limiting factors such as lack of water control, adverse weather, and unfavourable soil conditions preclude high yields.

The demonstration value of the trials is attested by the interest taken by the cultivators in these trials, the clamour on the part of cultivators for the siting of the experiments in their fields and the numerous inquiries from those who had seen roadside plots.