

Chilean Nitrate as a Fertilizer for Ragi (*Eleusine coracana*)

by

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Introduction: Chilean nitrate, according to the Nitrate Corporation of Chile, London, is a natural fertilizer obtained from the mineral deposits of Northern Chile. Its special properties are attributed to the natural blending of plant nutrients. Chilean nitrate contains 16 percent nitrogen in the nitrate form, directly assimilable by the roots of plants. It is most efficient as a top dressing dissolving rapidly into the soil and providing the crop with immediately available nitrogen. The effect is maintained during the entire growing period and is often seen on the subsequent crops. Owing to its natural stability, Chilean nitrate, is unaffected by soil conditions and is not subject to any loss of nitrogen by volatilization. It increases the activities of microorganisms in the soil and therefore has special value where conditions of reduced bacterial action prevail as a result of high temperature. The availability of phosphates in the soil is increased by the use of Chilean nitrate. It also conserves soil calcium and prevents acidification. The supplementary action of sodium improves the vigour of plants giving them strength to withstand attacks of pests and disease. Chilean nitrate also decreases wilting in hot dry weather.

The manurial ingredients removed from the soil by ragi according to Wood (1952) are 49 lb. of nitrogen, 30 lb. of P_2O_5 and 202 lb. of K_2O per acre. The cultivators manure their fields liberally with 20 cartloads of farm yard manure and with wood ash at 2 cartloads per acre. They have also lately taken to top dressing of ammonium sulphate at 100 lb. per acre one month after planting. Some of the ryots apply super phosphate by placement at 100 lb. per acre just prior to planting. Application of 20 cartloads of farm yard manure per acre a week to ten days before planting, super phosphate at 100 lb. per acre by placement just prior to planting and top dressing of ammonium sulphate at 100 lb. per acre one month after planting is the manurial regimen adopted on the station and recommended to the cultivators. At the Agricultural Research Station, Palur, a trial was conducted for four seasons to study the usefulness of Chilean nitrate as fertilizer for ragi, the results of which are presented in this paper.

Experimental Details: The object of the experiment was to assess the relative merits of ammonium sulphate and Chilean nitrate on ragi at 40 lb. nitrogen and 60 lb. nitrogen per acre when applied alone and in combination with lime, farm yard manure and super phosphate. The variants included in the experiment are the following:

1. Basal dressing of lime at 450 lb. + cattle manure at 3 tons and super phosphate to supply 30 lb. P_2O_5 per acre.
2. Same as 1 + ammonium sulphate to supply 40 lb. nitrogen per acre.
3. Same as 1 + ammonium sulphate to supply 60 lb. nitrogen per acre.
4. Ammonium sulphate alone to supply 40 lb. nitrogen per acre.
5. Ammonium sulphate alone to supply 60 lb. nitrogen per acre.
6. Same as 1 + Chilean nitrate to supply 40 lb. nitrogen per acre.
7. Same as 1 + Chilean nitrate to supply 60 lb. nitrogen per acre.
8. Chilean nitrate alone to supply 40 lb. nitrogen per acre.
9. Chilean nitrate alone to supply 60 lb. nitrogen per acre.

The experiment was started during 1952—53 May to September season and continued for three more seasons viz., December to March season 1952—53, May to September and December to March seasons 1953—54. The trial was laid out with the above treatments in randomized blocks replicated five times. Though manurial treatments were different yet all the nine treatments received the same cultural treatments. Farm yard manure was applied ten days before planting and super phosphate by placement a day prior to planting. The plots received mummy digging to incorporate the manures.

The strain of ragi used in the experiment was P. L. R. 1 with a seed rate of 1 lb. of seed per cent; 25 days old seedlings were planted in singles giving a spacing of one link each way. After one month, all the treatments except treatment No. 1 were top dressed with the scheduled quantities of the fertilizers. It was observed that the crop in treatment No. 1 receiving the basal dressing only was pale green and stunted in growth and the flowering was delayed by about three to four days while the other eight treatments did not show much difference among themselves.

Results: The yield data for the four seasons were analysed statistically for individual seasons and the combined effect and the summary of results is presented in the Table I.

In three out of four seasons' trials treatment No. 1 consisting of the basal dressing only has recorded significantly poor yields than all the other eight treatments. During 1953—54 May to September season it is on a par with treatments 4, 8 and 9 i. e. Ammonium sulphate alone at 40 lb. nitrogen and Chilean nitrate alone at 40 lb. nitrogen and 60 lb. nitrogen per acre respectively and significantly lower than the other treatments 2, 3, 5, 6 and 7. During all the four seasons the treatments 2, 3, 6 and 7 receiving artificials at 40 lb. and 60 lb. nitrogen per acre together with the basal dressing have recorded better yields than their counterparts 4, 5, 8 and 9 receiving no basal dressing. The above conclusions are confirmed in the combined effect for all the four seasons put together. The order of sequence of treatments in all the four seasons' trials and the combined effect indicate that ammonium sulphate has given slightly better out turn than Chilean nitrate.

The over all-yields of treatments receiving ammonium sulphate compared with treatments receiving Chilean nitrate expressed as percentages are as follows :

	1952—'53 May to September	1952—'53 December to March	1953—'54 May to September	1953—'54 December to March	Combined effect of all four seasons
Ammonium sulphate	103.0	100.0	103.0	106.6	104.2
Chilean nitrate	97.0	100.0	97.0	93.4	95.8

Summary: Ragi crop grown with a basal dressing of lime at 450 lb. + cattle manure at 3 tons + super phosphate to supply 30 lb. P_2O_5 per acre is stunted in growth, pale green in colour, delayed in flowering by about 3 to 4 days and recorded very low yield, significantly lower than all the other eight treatments receiving a top dressing of the artificials one month after planting. The basal dressing of lime, cattle manure and super-phosphate helps in increasing the yield of ragi when applied in combination with the artificials as is evidenced by the performance of treatments 2, 3, 6 and 7 as compared with their counterparts 4, 5, 8 and 9 receiving no

basal dressing. Though ammonium sulphate records increasing yields over Chilean nitrate and in both fertilizers 60 lb. nitrogen gives a better effect than 40 lb. nitrogen, yet statistical evidence, except in the case of 1952—'53 May to September season, does not show significant increase. The following conclusions are drawn.

1. A basal dressing of lime at 450 lb. + cattle manure at 3 tons + superphosphate at 30 lb. P_2O_5 per acre by itself records very low yields of ragi unless supplemented by a top dressing of either ammonium sulphate or chilean nitrate.

2. The artificials record increased yields when applied in combination with the basal dressing than when applied alone.

3. The heavier dose of 60 lb. nitrogen per acre records better yields than 40 lb. nitrogen per acre in the case of both the fertilizers but the increase is not significant, except in 1952—'53 May to September season.

4. Though ammonium sulphate records increased yield over Chilean Nitrate, the yield difference is slight and not significant.

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REFERENCE

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TABLE I.
Summary of Results

Season of Trial	Particulars	TREATMENTS									Fisher's Z' test satisfied or not (P=0.05)			
		1	2	3	4	5	6	7	8	9		G. M. S. E.		
1952—1953 May to September December to March	Acre yield of grain in lbs.	748	1129	1498	921	1096	1169	1299	1068	1113	1112	43		124
	Percentage on Control	100.0	150.9	200.3	154.9	146.5	156.3	173.6	142.7	148.7	149.0	5.8	Yes	16.7
	Acre yield of grain in lb.	597	1014	1104	962	1108	1132	1058	936	830	971	62		180
	Percentage on Control	100.0	169.8	184.9	161.2	185.8	189.8	177.4	156.8	139.1	162.6	10.4	Yes	30.1
1953—1954 May to September December to March	Acre yield of grain in lb.	378	585	620	462	491	502	586	429	366	491	34	Yes	94
	Percentage on Control	100.0	154.7	167.8	122.4	130.0	132.8	155.0	113.3	97.0	130.3	8.6		24.8
	Acre yield of grain in lb.	998	1835	2178	1769	1795	1919	2045	1627	1887	1727	92		264
	Percentage on Control	100.0	184.0	218.2	175.7	179.0	192.3	204.8	162.9	132.2	177.8	9.4	Yes	27.1
Combined four Seasons	Acre yield of grain in lb.	643	1117	1300	1000	1097	1153	1213	993	887	1045	70		203
	Percentage on Control	100.0	173.6	202.0	155.4	170.4	179.3	188.6	154.4	137.8	162.4	10.9	Yes	31.5

1952—1953

May to September Season 3, 7, 6, 4, 2, 9, 5, 8, 1

December to March Season 6, 5, 3, 7, 2, 4, 8, 9, 1

Combined effect of all the four Seasons 3, 7, 6, 2, 5, 4, 8, 9, 1

Conclusions

1953—1954

May to September Season 3, 7, 2, 6, 5, 4, 8, 1, 9

December to March Season 3, 7, 6, 2, 5, 4, 8, 9, 1