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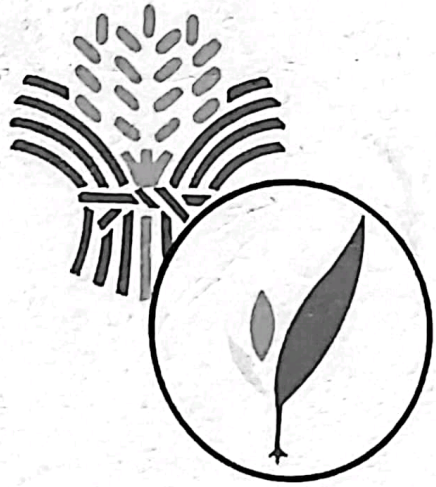

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UTILIZATION OF MADRE DE CACAO AND IPIL-IPIL LEAVES AS ORGANIC FERTILIZERS FOR FIELD CORN PRODUCTION

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ABSTRACT

A two-year study was undertaken at the experimental area of the La Granja National Crop Research and Development Center, La Carlota City, Negros Occidental attempting to look for alternative and economical sources of fertilizer for corn.

The experiment was laid out in a randomized complete block design in four replications. The treatments consisted of air-dried leaves of madre de cacao and ipil-ipil as organic fertilizers combined with inorganic fertilizer in different quantities namely: T1-3 tons Ipil-ipil leaves/ha, T2-4.5 tons ipil-ipil leaves/ha, T3-6 tons ipil-ipil leaves/ha, T4-3 tons ipil-ipil leaves/ha + 30-15-15 kg NPK/ha, T5-4.5 tons ipil-ipil leaves/ha + 30-15-15 kg NPK/ha, T6-6 tons ipil-ipil leaves/ha + 30-15-15 kg NPK/ha, T7-3 tons madre de cacao leaves/ha, T8-4.5 tons madre de cacao leaves/ha, T9-6 tons madre de cacao leaves/ha, T10-3 tons madre de cacao leaves/ha + 30-15-15 kg NPK/ha, T11-4.5 tons madre de cacao leaves/ha + 30-15-15 kg NPK/ha, T12-6 tons madre de cacao leaves/ha + 30-15-15 kg NPK/ha, T13- Recommended Rate (60-30-30 kg NPK/ha) and T14-Control (no fertilizer).

Significant results were obtained on grain yield and plant height of corn. Application of 3 to 6 tons ipil-ipil or madre de cacao leaves plus inorganic fertilizer at the

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Almodiente and Octavio (1985) found that mudpress alone or in combination with inorganic fertilizer applied to soybean had comparable yield than using commercial fertilizer alone. Their study revealed that during dry season, highest soybean yield of 1.25 tons/ha was obtained from 20-50-0 kg NPK + 5 tons mudpress/ha at 200,000 plants/ha. At 300,000 plants/ha highest yield 1.36 tons/ha was obtained with 20-25-0 kg NPK + 10 tons mudpress/ha while at 400,000 plants/ha + 15 tons mudpress/ha gave the highest yield with 1.45 tons/ha. Wet season yield were comparable in 20-25-0 kg NPK/ha + 10 tons mudpress/ ha at 300,000 plants/ha, 15 tons mudpress/ha at 400,000 plants/ha and and 40-50-0 kg NPK/ha at 200,000 plants/ha with 1.63 and 1.67 t/ha, respectively. Sukthomrung *et al* (1972) found that the combination of N and P fertilizers resulted to a yield of 5.417 kg/ha.

Vacharotayan *et al* (1970) reported that the average corm yield of 2,646 kg/ha was obtained from the application of inorganic fertilizer. Without fertilizer, the yield was only 407 kg/ha. It was further observed that the best combination was N, P and K fertilizers which yielded 3,057.1 kg/ha, while the combination of N and P gave only 2,900 kg/ha.

Fatrel and Abdullahi (1967) reported that corn and sorghum yields can be increased through the use of green manure crops. Their 5-years study revealed that corn yield increased by 27% during the first year of green manure application. The residual effect of the green manure applied on the second year resulted to 5% increase in corn yield.

Experiments conducted at the UPLB revealed that Ipil- ipil is a good source of nitrogen fertilizer. Under submerged and non-submerged conditions, ipil-ipil was as effective as ammonium sulfate in supplying the N requirement of rice plant.

OBJECTIVES

General:

To reduce cost of fertilizer through the use of organic fertilizers and their combinations with in-organic fertilizer.

Specific:

1. To determine the best fertilizer combination and rate that could give optimum yield.

2. To determine an economical source of fertilizer that could give highest return for corn.

METHODOLOGY

Duration and place of the Study

The study was conducted for two (2) years from crop year 1991-92 to crop year 1992-93 at the experimental area of the La Granja National Crop Research and Development Center , La Carlota City, Negros Occidental.

Treatments and Experimental Design

Air-dried leaves of madre de cacao and ipil-ipil as organic fertilizers in combination with inorganic fertilizer in different quantities were used as treatments, namely:

T1 - 3.0 tons ipil-ipil leaves/ha
T2 - 4.5 tons ipil-ipil leaves/ha
T3 - 6.0 tons ipil-ipil leaves/ha
T4 - 3.0 tons ipil-ipil leaves + 30-15-15 kg NPK/ha
T5 - 4.5 tons ipil-ipil leaves + 30-15-15 kg NPK/ha
T6 - 6.0 tons ipil-ipil leaves + 30-15-15 kg NPK/ha
T7 - 3.0 tons madre de cacao leaves/ha
T8 - 4.5 tons madre de cacao leaves/ha
T9 - 6.0 tons madre de cacao leaves/ha
T10 - 3.0 tons madre de cacao leaves + 30-15-15 kg NPK/ha
T11 - 4.5 tons madre de cacao leaves + 30-15-15 kg NPK/ha
T12 - 6.0 tons madre de cacao leaves + 30-15-15 kg NPK/ha
T13 - Recommended Rate (60-30-30 kg NPK/ha)

T14 - Control (No fertilizer)

The treatments were laid out in a randomized complete block design in four replications.

Planting and Fertilizer Application

Corn seeds were sown at 20 cm between hills and 75 cm between furrows in a 5x3 m plot. Corn plants were thinned to one plant/ hill two weeks after planting.

All organic fertilizers of air-dried leaves of madre de cacao and ipil-ipil having 10.9 and 10.3% moisture, respectively were incorporated into the soil two weeks before planting. Likewise, one-half of nitrogen and all phosphorous and potassium inorganic fertilizers were applied in furrows at planting. The remaining nitrogen fertilizer was sidedressed 30 days thereafter. Necessary cultural practices such as weeding, cultivation, pest and diseases control were employed during the growth period of the crop.

Collection of Data

The following data were gathered:

1. Grain yield
2. Plant height
3. Economic analysis
4. Soil analysis
5. Monthly rainfall distribution

The growth and yield parameters were taken from the two center rows of each plot.

RESULTS AND DISCUSSION

a. Yield

Different levels of air-dried madre de cacao and ipil- ipil leaves and their combination with inorganic fertilizer effected significant differences on corn yield both during the wet and dry seasons (Table 1).

Table 1. Mean yield (t/ha) of corn, IPB Var 1 in response to the application of different levels of air-dried, Madre de cacao and ipil-ipil leaves in combination with inorganic fertilizer.

TREATMENTS	CROP YIELD (t/ha)					
	Wet Season			Dry Season		
	1991	1992	Mean	1991-92	1992-93	Mean
3.0 tons Ipil-ipil Leaves/ha	1.192	2.653	1.922de	1.327	1.400	1.363cd
4.5 tons Ipil-ipil Leaves/ha	1.358	2.518	1.938de	2.358	1.469	1.913bc
6.0 tons Ipil-ipil Leaves/ha	1.409	3.126	2.267de	2.124	1.83	1.977bc
3.0 tons Ipil-ipil Leaves +30-15-15 kg NPK/ha	2.975	3.831	3.403a-d	1.835	1.996	1.915bc
4.5 tons Ipil-ipil Leaves +30-15-15 kg NPK/ha	3.25	5.020	4.135ab	3.069	2.416	2.743ab
6.0 tons Ipil-ipil Leaves +30-15-15 kg NPK/ha	3.95	5.951	4.950a	2.590	2.973	2.781ab
3.0 tons Madre de Cacao Leaves/ha	1.237	2.959	2.098de	1.415	2.428	1.915bc
4.5 tons Madre de Cacao Leaves/ha	1.396	3.218	2.307c-e	2.476	2.423	2.449a-c
6.0 tons Madre de Cacao Leaves/ha	1.601	3.446	2.523b-d	2.144	2.666	2.405a-c
3.0 tons Madre de Cacao Leaves + 30-15-15 kg NPK/ha	3.105	3.745	3.425a-d	2.106	2.210	2.158a-c
4.5 tons Madre de Cacao Leaves + 30-15-15 kg NPK/ha	3.775	4.570	4.172ab	3.32	2.955	3.137a
6.0 tons Madre de Cacao leaves + 30-15-15 kg NPK/ha	4.125	5.580	4.852a	2.946	3.361	3.153a
Recommended Rate	4.375	3.700	4.037a-c	2.553	2.283	2.418a-c
Control (no fertilizer)	.505	1.050	.777e	.735	.758	.746d
C.V. (%)			16.94			15.72

Means having the same letter are not significantly different at 5%, DMRT.

Application of 6 tons Ipil-ipil leaves + 30-15-15 kg NPK/ha of inorganic fertilizer gave the highest significant grain yield with a mean of 4.95 tons/ha. However, its yield was comparable to those treatments applied with 6 tons madre de cacao leaves + 30-15-15 kg NPK/ha inorganic fertilizer (4.852 tons), 4.5 tons madre de cacao leaves + 30-15-15 kg NPK/ha inorganic fertilizer (4.172 t), 4.5 tons ipil ipil leaves + 30-15-15 kg NPK/ha inorganic fertilizer (4.135 t), Recommended Rate 60-30-30 kg NPK/ha inorganic fertilizer (4.037 t), 3 tons madre de cacao leaves + 30-15- 15 kg NPK/ha inorganic fertilizer (3.425 t), and 3 tons ipil- ipil leaves + 30-15-15 kg NPK/ha inorganic fertilizer (3.403 t). Lowest yield was observed from the control treatment (no fertilizer) with a mean yield of 0.777 t/ha. The dry season results showed that highest mean yield of 3.153 t/ha was obtained from treatment applied with 6 tons madre de cacao leaves + 30-15-15 kg NPK/ha inorganioc fertilizer. Comparable grain yields were observed from the application of 4.5 tons madre de cacao leaves + 30-15-15 kg NPK/ha inorganic fertilizer, 6 tons ipil-ipil leaves + 30-15-15 kg NPK.ha inorganic fertilizer, 4.5 tons madre de cacao leaves/ha. Recommended Rate 60-30-30 kg NPK/ha inorganic fertilizer, 6 tons madre de cacao leaves/ha, and 3 tons madre de cacao leaves + 30-15-15 kg NPK/ha inorganic fertilizer with respective mean yield of 3.137, 2.781, 2.743, 2.449, 2.418, 2.405 and 2.158 t/ha. The control treatment gave the lowest yield with 0.746 t/ha.

The yield date indicate that corn responded well to the application of a combination of organic and inorganic fertilizers during the wet and dry seasons. Application of 3 to 6 tons ipil-ipil or madre de cacao leaves plus inorganic fertilizer at the rate of 30-15-15 kg NPK/ha gave significantly better yield than those applied only with organic fertilizers and no fertilizer at all.

The trend of the yield data during the dry season showed that comparable yield performance was observed in the application of 4.5 ton to 6.0 tons ipil-ipil leaves + 30-15- 15 kg NPK/ha of inorganic fertilizer, 4.5 to 6 tons madre de cacao leaves alone or 3 to 6 tons madre de cacao + 30-15-15 kg NPK/ha inorganic fertilizer and 60-30-30 kg NPK/ha inorganic fertilizer.

b. Plant Height

Wet season results showed that treatment applied with 4.5 tons madre de cacao leaves +30-15-15 kg NPK/ha inorganic fertilizer got the tallest plants with 239.37 cm but comparable to all treatment except in treatments applied with 3 tons ipil-ipil leaves/ha andthe control (no fertilizer) with respective mean height of 207.3 and 197.85 cm (Table 2).

Table 2. Mean plant height (cm) of corn, IPB Var 1 in response to the application of different levels of air-dried, Madre de cacao and ipil-ipil leaves in combination with inorganic fertilizer.

TREATMENTS	PLANT HEIGHT (cm)					
	Wet Season			Dry Season		
	1991	1992	Mean	1991-92	1992-93	Mean
3.0 tons Ipil-ipil Leaves/ha	188.1	226.5	207.3bc	163.45	130.00	146.72cd
4.5 tons Ipil-ipil Leaves/ha	211.1	228.1	219.6a-c	174.15	149.85	162.0b-d
6.0 tons Ipil-ipil Leaves/ha	200.8	3.126	2.267ab	2.124	1.83	172.62ab
3.0 tons Ipil-ipil Leaves +30-15-15 kg NPK/ha	212.5	255.95	234.22ab	188.0	149.8	168.9a-c
4.5 tons Ipil-ipil Leaves +30-15-15 kg NPK/ha	223.15	255.6	239.37a	200.95	165.45	183.2ab
6.0 tons Ipil-ipil Leaves +30-15-15 kg NPK/ha	210.35	256.4	233.37ab	206.5	166.55	186.52a
3.0 tons Madre de Cacao Leaves/ha	210.3	235.75	223.02a-c	184.9	173.8	179.35a
4.5 tons Madre de Cacao Leaves/ha	215.4	229.4	222.4a-c	204.1	173.5	188.8a
6.0 tons Madre de Cacao Leaves/ha	210.85	235.4	223.12a-c	201.6	170.45	186.02a
3.0 tons Madre de Cacao Leaves + 30-15-15 kg NPK/ha	212.0	250.2	231.7ab	211.6	172.45	192.02a
4.5 tons Madre de Cacao Leaves + 30-15-15 kg NPK/ha	211.85	262.35	237.1a	206.5	175.6	191.05a
6.0 tons Madre de Cacao leaves + 30-15-15 kg NPK/ha	222.5	254.25	238.37a	195.5	189.55	192.52a
Recommended Rate	219.4	241.8	230.6ab	209.85	173.35	191.6a
Control (no fertilizer)	181.95	213.75	197.85c	151.5	129.75	140.62d
C.V. (%)			3.57			4.16

During the dry season, application of 6 tons madre de cacao leaves + 30-15-15 kgs NPK/ha inorganic fertilizer exhibited the tallest plants with a mean of 192.52 cm. which was comparable to all other treatments except treatments 3 tons ipil-ipil leaves/ha, 4.5 tons ipil-ipil leaves/ha and the control (no fertilizer) with a mean of 146.76, 162.0 and 140.62 cm, respectively.

c. Incidence of Pests and Diseases

It was observed that corn plants in all treatments were moderately resistant to corn borer and earworm. The crop was resistant to downy mildew, rust and stalk rot both during the wet and dry seasons.

d. Economic Analysis

Marginal Rate of Return (MRR) during the wet season was highest in the application of 3 tons Madre de cacao leaves/ha with 481.40% but closely followed by 6 tons ipil- ipil leaves + 30-15-15 kg NPK/ha inorganic fertilizer with MRR of 481.35. The Recommended Rate 60-30-30 kg NPK/ha inorganic fertilizer , 4.5 tons madre de cacao + 30 - 15 - 15 kgs NPK/ha inorganic fertilizer and 3 tons madre de cacao leaves/ ha obtained viable MRR 91.36, 50.24 and 48.62% .

Table 3. Economic analysis of corn in response to the application of different levels of Madre de Cacao and Ipil-ipil leaves and their combination with inorganic fertilizer during the wet season.

TREATMENTS	Grain Yield (t/ha)	Gross 1/ Return (P)	Treatment Cost 2/ (P)	Net Return (P)		MRR
Control (No fertilizer)	.777	2,719.5	987.75	1,931.75		-
3.0 tons Ipil-ipil Leaves/ha	1.922	6,727.00	3,277.05	3,449.95		75.05
3.0 tons Madre de Cacao leaves/ha	2.098	7,343.00	3,383.00	3,960.00		481.40
4.5 tons Ipil-ipil Leaves/ha	1.938	6,783.00	4,036.65	2,746.35	D	-
4.5 tons Madre de Cacao leaves/ha	2.307	8,074.50	4,258.80	3,815.70	D	-
6.0 tons Ipil-ipil Leaves/ha	2.267	7,934.50	4,984.75	2,949.75	D	-
6.0 tons Madre de Cacao leaves/ha	2.523	8,830.50	5,138.85	3,691.65	D	-
Recommended Rate (60-30-30 kg/ha)	4.037	14,129.50	5,167.50	8,962.00		284.87
3.0 tons Ipil-ipil Leaves +30-15-15 kg NPK/ha	3.403	11,910.50	5,277.90	6,632.60	D	-
3.0 tons Madre de Cacao leaves + 30-15-15 kg NPK/ha	3.425	11,987.50	5,291.15	6,696.35	D	-
4.5 tons Ipil-ipil leaves +30-15-15 kg NPK/ha	4.135	14,472.50	6,468.60	8,003.90	D	-
4.5 tons Madre de Cacao Leaves + 30-15-15 kg NPK/ha	4.172	14,602.00	6,490.85	8,111.15	D	-
6.0 tons Madre de Cacao Leaves + 30-15-15 kg NPK/ha	4.852	16,982.00	7,650.20	9,331.80		15.58
6.0 tons Ipil-ipil Leaves +30-15-15 kg NPK/ha	4.950	17,325.00	7,709.20	9,615.80		481.35

1/ Farm gate Price of corn - P 3.50/kg

2/ Include costs of fertilizer, Ipil-ipil and Madre de cacao leaves, sacks, application of fertilizer, labor, pesticides, harvesting and processing of corn.

Table 4. Economic analysis of corn in response to the application of different levels of Madre de Cacao and Ipil-ipil leaves and their combination with inorganic fertilizer during the dry season.

TREATMENTS	: Grain : Yield : (t/ha)	: Gross1/ : Return : (P)	:Treatment: Cost 2/ : (P)	Net : Return : (P)	:	MRR
Control (No fertilizer)	.746	2,611.00	969.10	1,641.90		-
3.0 tons Ipil-ipil Leaves/ha	1.363	4,770.50	2,940.50	1,830.00		9.54
3.0 tons Madre de Cacao leaves/ha	1.915	6,702.50	3,272.85	3,429.65		481.31
4.5 tons Ipil-ipil Leaves/ha	1.913	6,695.50	4,021.60	2,673.90	D	-
Recommended Rate (60-30-30 kg NPK/ha)	2.418	8,463.00	4,192.80	4,270.20		91.36
4.5 tons Madre de Cacao leaves/ha	2.449	8,571.50	4,344.30	4,227.20	D	-
6.0 tons Ipil-ipil Leaves/ha	1.977	6,919.50	4,810.50	2,109.00	D	-
6.0 tons Madre de Cacao leaves/ha	2.405	8,417.50	5,067.80	3,340.70	D	-
3.0 tons Ipil-ipil Leaves +30-15-15 kg NPK/ha	1.915	6,702.50	4,382.15	2,320.35	D	-
3.0 tons Madre de Cacao leaves + 30-15-15 kg NPK/ha	2.158	7,553.00	4,528.40	3,024.60	D	-
4.5 ton. Ipil-ipil leaves +30-15-15 kg NPK/ha	2.743	9,600.50	5,630.60	3,969.90	D	-
4.5 tons Madre de Cacao Leaves + 30-15-15 kg NPK/ha	3.137	10,979.50	5,867.75	5,111.75		50.24
6.0 tons Madre de Cacao Leaves + 30-15-15 kg NPK/ha	3.153	11,035.50	6,627.40	4,408.10	D	-
6.0 tons Ipil-ipil Leaves +30-15-15 kg NPK/ha	2.781	9.733.50	6,403.45	3,330.05	D	-

1/ Farm gate Price of corn - P 3.50/kg

2/ Include costs of fertilizer, Ip ipil and Madre de cacao leaves, sacks, application of fertilizer, labor, pesticides, harvestin and processing of corn.

CONCLUSIONS

Based on the results of the two-year study, the following findings can be drawn.

- Application of 3 to 6 tons organic fertilizers such as ipil-ipil and madre de cacao leaves in combination with inorganic fertilizer at the rate of 30-15-15 kg NPK/ha during the wet season increased corn yield comparable to those applied with the recommended rate (60-30-30 kg NPK/ha) inorganic fertilizer.

- Better corn yield in the dry season was obtained with the application of 4.5 to 6 tons ipil-ipil leaves + 30- 15-15 kg NPK/ha of inorganic fertilizer, 4.5 to 6 tons madre de cacao leaves/ha or 3 to 6 tons madre de cacao leaves + 30-15-15 kg NPK/ha inorganic fertilizer.

- The use of 3 tons madre de cacao leaves/ha both during the wet and dry seasons gave the highest Marginal Rate of Return (MRR) of 481.40 and 481.3%, respectively.

Other viable treatments during the wet and dry season were 6 tons ipil-ipil leaves + 30-15-15 kg NPK/ha inorganic fertilizer with MRR of 481.35%; Recommended Rate with 284.87%; and 3 tons ipil-ipil leaves/ha with 45.35%. In the dry season, Recommended Rate of inorganic fertilizer and 4.5 tons madre de cacao leaves + 30-15-15 kg NPK/hs inorganic fertilizer were also considered viable with MRR of 91.36 and 50.24%, and 48.62, respectively .

RECOMMENDATIONS

1. For better corn yield, the use of 3-6 tons ipil-ipil or madre de cacao leaves plus 1/2 Recommended Rate (30- 15-15 kg NPK/ha) of inorganic fertilizer is recommended during the wet season.

2. For dry season planting, madre de cacao leaves alone at the rate of 4.5 to 6 tons per hectare or 3 to 6 tons madre de cacao leaves

plus 1/2 Recommended Rate inorganic fertilizer and 4.5 to 6 tons ipil-ipil leaves + 1/2 Recommended Rate of inorganic fertilizer can be an alternative fertilizer for corn.

3. For subsistence farming, 3 tons madre de cacao leaves is a viable source of fertilizer for corn.

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Appendix Table 1. Soil analysis of the experimental area before planting.

TREATMENTS	pH	O.M/N (%)	P (ppm)	K (ppm)
3.0 tons Ipil-ipil Leaves/ha	6.3	1.5	80	160
4.5 tons Ipil-ipil Leaves/ha	6.3	1.5	75	140
6.0 tons Ipil-ipil Leaves/ha	6.1	1.5	77	80
3.0 tons Ipil-ipil Leaves + 30-15-15 kg NPK/ha	6.0	1.5	74	144
4.5 tons Ipil-ipil Leaves + 30-15-15 kg NPK/ha	6.4	1.5	74	80
6.0 tons Ipil-ipil Leaves 30-15-15 kg NPK/ha	5.9	1.5	81	96
3.0 tons Madre de Cacao Leaves/ha	6.0	1.5	51	96
4.5 tons Madre de Cacao Leaves/ha	5.9	1.5	52	144
6.0 tons Madre de Cacao Leaves/ha	6.2	1.5	52	112
3.0 tons Madre de Cacao Leaves + 30-15-15 kg NPK/ha	6.3	1.5	51	112
4.5 tons Madre de Cacao Leaves + 30-15-15 kg NPK/ha	6.3	1.5	56	112
6.0 tons Madre de Cacao leaves + 30-15-15 kg NPK/ha	5.8	1.5	56	160
Recommended Rate (60-30-30 kg NPK/ha)	5.7	1.5	52	144
Control (no fertilizer)	5.8	1.5	48	122

Note: Soils samples were analyzed at DA Soils Laboratory, Region VI, Iloilo City.

Appendix Table 2. Soil analysis of the experimental area after the study.

Treatment	pH	OM/N (%)	P (ppm)	K (ppm)	CA (ppm)	Mg (ppm)	Al (ppm)
3.0 tons Ipil-ipil leaves/ha	6.3	3.45	43	378	1273	126	26
4.5 tons Ipil-ipil leaves/ha	6.4	3.02	119	380	1223	120	20
6.0 tons Ipil-ipil leaves/ha	6.6	2.39	43	349	1359	119	17
3.0 tons Ipil-ipil leaves + 30-15-15 kg NPK/ha	6.5	3.54	50	314	1320	117	22
4.5 tons Ipil-ipil leaves + 30-15-15 kg NPK/ha	6.5	3.32	42	383	1489	121	22
6.0 tons Ipil-ipil leaves + 30-15-15 kg NPK/ha	6.6	3.75	37	347	1483	133	22
3.0 tons Madre de Cacao leaves/ha	6.7	3.07	37	332	1622	125	38
4.5 tons Madre de Cacao leaves/ha	6.6	3.05	41	414	1704	124	25
6.0 tons Madre de Cacao leaves/ha	6.5	1.22	40	302	1234	123	17
3.0 tons Madre de Cacao leaves + 30-15-15 kg NPK/ha	6.6	1.21	37	348	1242	111	23
4.5 tons Madre de Cacao leaves + 30-15-15 kg NPK/ha	6.4	1.37	42	447	1262	111	18
6.0 tons Madre de Cacao leaves + 30-15-15 kg NPK/ha	6.4	1.32	64	265	1204	120	30
60-30-30 kg NPK/ha (Recommended Rate)	6.6	1.10	40	310	1028	107	27
Control (no fertilizer)	6.3	1.97	43	322	1175	105	25

Note: Soil samples were analyzed at the SRA, Soils Laboratory, La Carlota City.

Appendix Table 3. Analysis of Madre de Cacao and Ipil-ipil leaves.

Element	Madre de Cacao 1/	Ipil-ipil 2/
Total N (%)	2.08	3.53
Total P_2O_5 (%)	0.33	0.45
Total K_2O (%)	2.24	2.47
Ca (%)	2.04	1.77
B (mg) (%)	13.25	6.83
Mg (%)	0.40	0.32
Fe (mg) (%)	20.78	0.37

1/ Analyzed at BPI Laboratory Services Division, Manila on February 6, 1989.

2/ Source: Victorias Milling Company, VNO, 1983. Cane Farm News a (2):8.

Appendix Table 4. Proximate chemical analysis of Madre de Cacao and Ipil-ipil (Adopted P.L. Teng, IRRI 1986).

Parameters	Madre de Cacao : Gliricidia sepium : H. B. and K.	Ipil-ipil : Leucaena leucocephala : (Lam) de Wit
1. Water (%)		
1.1 Leaves	7.9	9.2
1.2 Stem	7.7	9.2
1.3 L+S	10.6	
2. Dry Matter (%)		
2.1 Leaves	92.1	90.8
2.2 Stem	92.3	90.8
2.3 L+S	89.4	
3. Crude Protein (%)		
3.1 Leaves	22.2	20.9
3.2 Stem	6.3	6.3
3.3 L+S	20.1	
4. Crude Fiber (%)		
4.1 Leaves	11.1	18.0
4.2 Stem	16.2	47.7
4.3 L+S	13.6	
5. IVDMD (%) 1/		
5.1 Leaves	41.4	
5.2 Stem	67.7	
5.3 L+S	37.7	

1/ IVDMD - In Vitro Dry Matter Digestibility.

Appendix Table 5. Rainfall Data (mm) during the growth period of Corn.

Month	1991	1992	1993
January		9.5	5.4
February		1.5	58.3
March		6.8	16.9
April		25.3	38.3
May		135.4	
June	336.9	552.3	
July	398.1	428.0	
August	518.6	258.0	
September	239.7	355.6	
October	433.7	335.5	
November	407.3	167.2	
December	56.7	20.2	
Total	2391.0	2295.7	118.9
Mean	341.57	191.3	29.72