A long-term KCl fertilization study of bearing coconuts in an inland-upland area of Davao (Philippines) (1)

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Summary. — The effect of long-term KCl fertilization on bearing palms in an inland area of Davao was investigated from 1972 to 1977. KCl fertilization at 2 kg per tree per year gave the highest production of nuts. Copra weight per nut correspondingly increased with increasing KCl levels, while copra production per tree did not follow a definite trend of response. Highest copra yield per tree was obtained with 8 kg KCl treatment followed by 2, 4, 1 and 0 kg KCl levels. The critical level of leaf Cl (leaf 14) was suggested at 0.50-55 p. 100. Leaf Cl content was markedly correlated with nut and copra yield while no correlation existed between yield and leaf K. KCl fertilization also improved N and S nutrition of the palms both of which were likewise correlated with yield. Based on the price situation of 1977, the 2 kg KCl rate was the most economical treatment which gave the highest return per peso invested.

INTRODUCTION

Studies at the Davao Research Center of the Philippine Coconut Authority revealed that the response of coconut palm to KCl or muriate of potash (60 p. 100 K_2O and 44 p. 100 Cl) fertilization is attributed to its Cl component and not to K. Positive correlations were obtained between leaf Cl content and growth of young palms or production of bearing ones [Magat *et al.*, 1975 ; Prudente and Mendoza, 1976]. Likewise, Cl positively influenced the vegetative growth and nutritional status of coconut seedlings and most likely its tolerance to leaf spot diseases [Magat *et al.*, 1977].

In 1972, Mendoza and Prudente observed that an annual application of ammonium sulfate and KCl significantly increased nut and copra yield of bearing palms. Tall « Laguna » palms were induced to flower in less than four years from transplanting. This is a marked reduction in the pre-baring stage of the palms which usually take seven years to flower or eight years to have initial production.

The essentiality of chlorine for higher plants was established by Broyer *et al.* [1954], but on coconut, its role as macronutrient was advanced only in the seventies [Ollagnier and Ochs, 1971 ; von Uexkull, 1972 ; Mendoza and Prudente, 1972 ; and Magat *et al.*, 1975]. In inland areas chlorine is generally low because the amount of this element from rain water as well as from the soil varies considerably. It was estimated to range from 15 to 40 kg/ha/year, the amount varying with distance from the sea [Erikson, 1952].

Apart from this, chlorides are in general highly soluble and are not retained in any appreciable quantity in the soil organic matter or soil colloids. As a result, they are subject to heavy leaching and removal from the soil. This is particularly so in areas of high rainfall, *i. e.*, the humid tropics where coconuts are extensively grown.

On coconut, the physiological role of chlorine is not yet well understood. But on rice and other plants, Cl acts as co-enzyme in accelerating photosynthesis. Carbohydrate metabolism is then considerably perturbed, with a reduction of soluble sugars and accumulation of starch accompanied by thickening of the cuticle and reduction in the number of stomata [Fujiwara, 1976 ; Ollagnier *et al.*, 1977]. These physiological processes may also take place in the palm as regards its stem girth, leaf production and copra yield thereby deserving further investigation.

This study was initiated to find out the economic rate of KCl as Cl source for optimum coconut production and to investigate the nutrition of the palms in relation to regular long-term KCl fertilization.

MATERIALS AND METHODS

Soils and climatic conditions.

The soil used in this study is classified as Tugbok clay loam, reddish-brown residual soil with good internal and external drainage (Table I). Topography varies from undulating to slightly rolling.

The area has more or less even distribution of rainfall throughout the year. For the past 12 years, average rainfall amounts to 2,450 mm in 187 days. Adequate sunshine prevails year-round with relative humidity ranging from 78 to 85 p. 100 a condition suitable for coconut production.

Experimental design.

The study was arranged in a randomized complete block design consisting of five levels of KCl, replicated three times with nine experimental palms per treatment.

Experimental palms.

The palms used are of the tall « Laguna » type which were planted in 1956 in an 8 m square system of planting. The area was fully covercropped with tropical kudzu-centrosema mixture which were occasionally rolled down to regulate their growth.

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TABLE I. — **Soil analysis of Tugbok soil** *(Analyse du sol de Tugbok)*, **PCA-Davao Research Center, Bago-Oshiro, Davao City (Laboratory Services, Bureau of Soils)**

Properties *(Propriétés)*	Surface Soil *(Sol de surface)* (0-17 cm)	Sub-soil *(Sous-sol)* (17-80 cm)
Chemical *(chimiques)* :		
pH (1 : 1/soil H_2O)	6 50	6 70
Organic matter *(matière organique)* p. 100	1.73	1.40
Available P *(P disponible)* (ppm)	19.00	11.00
Total K, hot H_2SO_4 extractable *(K total extractible par SO_4H_2 à chaud)* (ppm)	624.000	687.000
Exchangeable cations *(cations échangeables)* m. e./100 g soil *(sol)*		
Ca	11.40	12.30
Mg	5.30	6.40
Na	0.08	0.18
K	0.45	0.29
CEC m. e./100 g soil *(sol)*	25.20	26.70
Base saturation *(saturation de base)* p. 100	68.30	71.90
Physical *(physiques)* :		
Textural grade *(texture)*	Clay loam *(Limon argileux)*	Clay *(Argile)*
p. 100 sand *(sable)*	32.90	23.30
p. 100 silt *(limon)*	33.30	28.90
p. 100 clay *(argile)*	33.90	47.80
Bulk density *(densité)* (g/cc)	1.58	1.45
Total porosity *(porosité totale)*	40.60	45.35
Moisture Retention Capacity *(capacité de rétention en eau)* :		
Field capacity *(capacité au champ)* (p. 100)	32.60	40.60
Permanent wilting point *(point de flétrissement)* (p. 100)	17.60	26.70
Available moisture *(eau disponible)* (p. 100)	14.90	13.80

Fertilizer treatment (1).

For the first two and a half years of experimentation, KCl rates per tree/year were as follows :

KCl (0) = control, KCl (3) = 2.50 kg,
KCl (1) = 0.83 kg, KCl (4) = 3.33 kg.
KCl (2) = 1.66 kg,

With these rates of KCl it was observed that the response of the palms in terms of copra yield was linear. Hence, there was still a need to increase the KCl level in order to find out the most economical rate which will give optimum production. So, for the next two and a half years the original KCl rates were changed as follows (/tree/year):

KCl (0) = control, KCl (2) = 2.0 kg,
KCl (1) = 1.0 kg, KCl (3) = 4.0 kg,
KCl (4) = 8 kg

A blanket application of 2 kg ammonium sulfate (21 p. 100 N and 24 p. 100 S) per tree/year was made. The fertilizers were applied semi-annually by broadcast and fork-in method within the two-meter radius around the base of the palms after circle-weeding.

Harvesting.

Harvesting was made every 45 days for nut and copra production record. Twenty nut samples per treatment were randomly collected to estimate copra weight per nut and per tree.

RESULTS AND DISCUSSION

Nut production.

As shown in Table II, a significant effect was already observed on nut production with 2 kg KCl treatment

TABLE II. — **Effect of KCl on annual nut production per tree** *(Effet de KCl sur la production annuelle de noix/arbre)*

Treatment *(Traitement)* kg KCl/tree/yr *(/arbre/an)*	Year *(Année)* 1	3	5
	number *(nombre)*		
KCl (0) control *(témoin)*	71.1	98.3	94.8
KCl (1) (1.0 kg)	94.4	133.7 (**)	117.5 (**)
KCl (2) (2.0 kg)	108.3 (*)	162.7 (**)	141.6 (**)
KCl (3) (4.0 kg)	96.4	143.9 (**)	127.8 (**)
KCl (4) (8.0 kg)	90.5	154.9 (**)	133.8 (**)
HSD 0.05	28.2	22.6	15.0
0.01	NS	30.6	20.4
C. V. (p. 100)	10.8	5.8	4.3

NS — Not significant *(Non significatif)* — (*) Significant *(Significatif)* — (**) Highly significant *(Hautement significatif)*.

during the first year. In the succeeding years all KCl levels significantly increased nut production over the control palms. This may be due to the improved general vigor of KCl-fertilized palms compared with the control. At any given year, it was evident that the highest nut production was obtained with 2 kg KCl treatment although no significant differences were observed among KCl levels except during the fifth year.

Looking at the average annual production (Table VI), palms treated with 2 kg KCl/tree/year produced the highest nut production of 128 as against 87 by the control, an increase of about 47 p. 100. The same pattern was observed on the accumulated production (Table V).

Response curve shows a quadratic pattern until 4 kg KCl rate, a trend similar to the previous report of Magat *et al.* [1975] when the highest KCl rate was only 3.33 kg/tree/year. It appears that maximum nut production was attained at 2 kg KCl treatment

(1) To facilitate discussion, KCl rates for the last two and a half years are used in this paper throughout the next.

slightly decreasing with further addition of KCl. However, when KCl rate was quadrupled to 8 kg/tree/year, the response became quartic, indicating that the palms somehow recovered up to a certain productivity level.

Copra weight per nut.

Significant increases in copra weight per nut were observed even with lower levels of KCl especially in later years (Table III). The response followed a linear pattern (Fig. 1) indicating that increasing KCl rates correspondingly increased copra weight per nut. This implies that the effect of Cl application is manifested more on the improvement of the thickness of the meat (Fig. 2). Based on average production for five years (Table VI), increases of 18, 21, 35 and 58 p. 100 over the control were realized with the application of 1, 2, 4 and 8 kg KCl, respectively.

TABLE III. — **Effect of KCl on average production of copra/nut** *(Effet de KCl sur la production moyenne de coprah/noix)*

Treatment *(Traitement)* kg KCl/tree/yr *(/arbre/an)*	Year *(Année)* 1	3	5
	gram *(grammes)*		
KCl (0) control *(témoin)*	135.1	171.1	151.1
KCl (1) (1.0 kg)	148.7	196.2 (*)	194.0 (*)
KCl (2) (2.0 kg)	147.3	204.7 (**)	203.8 (*)
KCl (3) (4.0 kg)	171.0 (*)	220.5 (**)	215.5 (**)
KCl (4) (8.0 kg)	199.5 (**)	262.5 (**)	246.9 (**)
HSD 0.05	29.707	19.218	40.005
0.01	40.277	26.056	54.24
C. V. (p. 100)	6.56	3.23	7.01

(*) Significant *(Significatif)* — (**) Highly significant *(Hautement significatif)*.

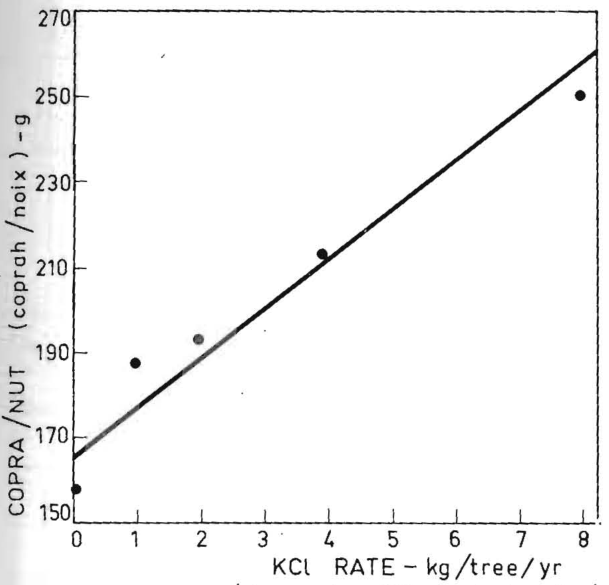

FIG. 1. — Effect of KCl on copra weight per nut (average of 5 years) *(Effet du KCl sur le poids de coprah/noix-moyenne de 5 ans)*.

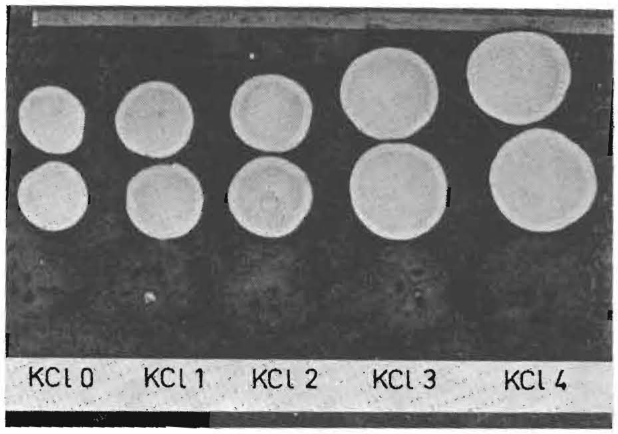

FIG. 2. — Nuts from the different KCl levels showing size and thickness of the meat and shell *(Noix montrant, pour différentes doses de KCl, l'importance et l'épaisseur de l'albumen et de la coque)*.

Copra per tree.

All KCl levels significantly improved copra production over the control from the first up to the fifth year (Table IV). On the accumulated production for five years significant increases were obtained even among KCl treatments (Table V). The highest KCl rate of 8 kg produced significantly the highest copra yield over all other treatments.

TABLE IV. — **Effect of KCl on annual copra production per tree** *(Effet de KCl sur la production annuelle de coprah/arbre)*

Treatment *(Traitement)* kg KCl/tree/yr *(/arbre/an)*	Year *(Année)* 1	3	5
	kilogram *(kg)*		
KCl (0) control *(témoin)*	9.58	16.79	14.40
KCl (1) (1.0 kg)	14.10 (**)	26.18 (**)	22.83 (**)
KCl (2) (2.0 kg)	15.93 (**)	33.17 (**)	28.73 (**)
KCl (3) (4.0 kg)	16.52 (**)	31.79 (**)	27.60 (**)
KCl (4) (8.0 kg)	18.06 (**)	40.59 (**)	32.93 (**)
HSD 0.05	0.43	5.183	3.78
0.01	0.583	7.028	5.125
C. V. (p. 100)	10.36	6.18	5.29

(**) Highly significant *(Hautement significatif)*.

TABLE V. — **Effect of KCl on accumulated nut and copra production per tree (40 harvests at 45 days interval)** *(Effect de KCl sur la production cumulée de noix et de coprah/arbre — 40 récoltes à 45 jours d'intervalle)*

Treatment *(Traitement)* kg KCl/tree/yr *(/arbre/an)*	Nut/tree *(Noix/arbre)* (no.) *(nombre)*	Copra/tree *(Coprah/arbre)* (kg)
KCl (0) control *(témoin)*	435.7	69.27
KCl (1) (1.0 kg)	548.6 (*)	103.25 (**)
KCl (2) (2.0 kg)	642.3 (**)	124.14 (**)
KCl (3) (4.0 kg)	560.8 (**)	120.54 (**)
KCl (4) (8.0 kg)	569.9 (**)	142.69 (**)
HSD 0.05	86.9	13.369
0.01	117.8	18.126
C. V. (p. 100)	5.6	4.23

(*) Significant *(Significatif)* — (**) Highly significant *(Hautement significatif)*.

An estimate of the copra production per hectare (Table X) shows that 8 kg KCl treatment gave about

TABLE VI. — **Effect of KCl on annual average nut and copra production (Average of 5 years)**
(Effet de KCl sur la production moyenne annuelle de noix et de coprah — moyenne de 5 ans)

Treatment *(traitement)* kg KCl/tree/yr *(/arbre/an)*	Nut/tree *(Noix/arbre)* (no.) *(nombre)*	Copra/nut *(Coprah/noix)* (g)	Copra/tree *(Coprah/arbre)* (kg)
KCl(0) control *(témoin)*	87.1	158.7	13.85
KCl(1) (1.0 kg)	109.7 (*)	187.4	20.65 (**)
KCl(2) (2.0 kg)	128.5 (**)	192.4 (*)	24.83 (**)
KCl(3) (4.0 kg)	112.2 (**)	214.5 (**)	24.11 (**)
KCl(4) (8.0 kg)	114.0 (**)	250.2 (**)	28.54 (**)

(*) Significant *(Significatif)* — (**) Highly significant *(Hautement significatif)*.

TABLE VII. — **Correlation coefficient (r) of yield (5th year) vs. leaf** *(Coefficient de corrélation — r — entre rendement — 5e année — et teneurs foliaires)* **Cl, N, S, K**

Leaf Nutrient *(Teneur foliaire)* p. 100	Nut/tree *(Noix/arbre)*	Copra/nut *(Coprah/noix)*	Copra/tree *(Coprah/arbre)*
N	0.528 (*)	0.583 (*)	0.604 (*)
S	0.543 (*)	0.522 (*)	0.580 (*)
Cl	0.746 (**)	0.862 (**)	0.897 (**)
K	0.172 NS	0.396 NS	0.299 NS

5 p. 100 = 0.514 — 1 p. 100 = 0.641. Tabular r at d. f. *(r pour d. l.)* = 13.
NS — Not significant *(Non significatif)*.
(*) Significant *(Significatif)* — (**) Highly significant *(Hautement significatif)*.

TABLE VIII. — **Effect of KCl on the nutritional status of bearing palms (leaf sampling of April, 1977)**
(Effet de KCl sur l'état nutritionnel des cocotiers-échantillonnage des feuilles d'avril 1977)

Treatment *(Traitement)* kgKCl/tree/yr *(/arbre/an)*	Nutrient *(Eléments)* (p. 100 dry matter, leaf rank 14 — *p. 100 de matières sèche, feuille de rang* 14)							
	N	P	K	Ca	Mg	Na	Cl	S
KCl(0) control *(témoin)*	1.778	0.143	1.270	0.498	0.216	0.062	0.043	0.162
KCl(1) (1.0 kg)	1.917	0.149	1.463	0.454	0.210	0.043	0.319 (**)	0.176
KCl(2) (2.0 kg)	1.912	0.147	1.391	0.433	0.198	0.041	0.549 (**)	0.173
KCl(3) (4.0 kg)	2.030	0.140	1.352	0.402	0.190	0.042	0.573 (**)	0.178
KCl(4) (8.0 kg)	1.947	0.156	1.432	0.477	0.217	0.052	0.700 (**)	0.176
HSD 0.05	NS	NS	NS	NS	NS	NS	0.108	NS
0.01	—	—	—	—	—	—	0.146	—
C. V. (p. 100)	4.29	8.36	11.42	19.87	20.67	51.34	8.91	4.55

NS — Not significant *(Non significatif)* — (**) Highly significant *(Hautement significatif)*.

TABLE X. — **Economic analysis per hectare/year, average of 5 years** (1)
(Analyse économique par ha/an — moyenne de 5 années) (1)

Treatment *(Traitement)* kg KCl/tree/yr *(/arbre/an)*	Cost of *(Coût de)*			Copra *(coprah)*		Net Return *(Bénéfice net)*	Return *(Bénéfice)* /peso invested *(investi)*
	Labor *(Main-d'oeuvre)* (P)	Fertilizer *(Engrais)* (P)	Total (P)	Yield *(Production)* (kg)	Value *(Valeur)* (P)	(P)	(P)
KCl(0) control *(témoin)*	739.44	313.56	1 053.00	2 160.6	3 240.90	2 187.90	2.08
KCl(1) (1.0 kg)	942.24	458.64	1 400.88	3 221.4	4 832.10	3 431.22	2.45
KCl(2) (2.0 kg)	1 070.16	603.72	1 673.88	3 873.5	5 810.25	4 136.37	2.47
KCl(3) (4.0 kg)	1 026.48	829.92	1 856.40	3 761.2	5 641.80	3 785.40	2.04
KCl(4) (8.0 kg)	1 132.56	1 213.68	2 346.24	4 452.2	6 678.30	4 332.06	1.85

(1) Based on 156 palms/ha with production costs and copra value as in Table IX *(basée sur 156 cocotiers/ha, avec les coûts de production et valeur du coprah du tableau IX)*.

4.45 tons/ha/year followed by KCl (2), KCl (3), KCl (1) and KCl (0) treatments with copra production per hectare of 3.87, 3.76, 3.22 and 2.16 tons, respectively.

Response curve indicated that copra production per tree was quadratic up to KCl (3) level and became quartic with the highest KCl rate of 8 kg/tree/year. This means that copra yield generally tended to increase with 2 kg KCl treatment, decrease at 4 kg KCl level, and rise again when KCl was raised to 8 kg. This inconsistent response in terms of copra

Treatment (2) (Traitement) kg KCl/tree/yr (/arbre/an)	Time spent in labor (Temps de travail): Circle weeding (Sarclage du rond) (min)	Fertilizer (3) application (engrais) (min)	Total (min)	Contractual labor (Main-d'oeuvre contractuelle): Equiv. in hours (en heures)	Cost at (Coût à) 1.00/hr. (P)	Harvesting (Récolte) (P)	Copra making (Fabric. du coprah) (P)	Fertilizer Cost (Coût de l'engrais) (P)	Total Expenses (Dépenses totales) (kg)	Copra Yield (coprah Rendt.) (P)	Copra Value (valeur) (P)	Net Return (Bénéf. net) (P)	Return (Bénéf.) /peso invested (investi) (P)
KCl (0) control (témoin) ...	78	24	102	1.70*	1.70	0.96	2.08	2.01	6.75	13.85	20.78	14.03	2.08
KCl (1) (1.0 kg)	78	26	104	1.73	1.73	1.21	3.10	2.94	8.98	20.65	30.98	22.00	2.45
KCl (2) (2.0 kg)	78	26	104	1.73	1.73	1.41	3.72	3.87	10.73	24.83	37.25	26.52	2.47
KCl (3) (4.0 kg)	78	26	104	1.73	1.73	1.23	3.62	5.32	11.90	24.11	36.17	24.27	2.04
KCl (4) (8.0 kg)	78	26	104	1.73	1.73	1.25	4.28	7.78	15.04	28.54	42.81	27.77	1.85

(1) Basis of analysis (*Base d'analyse*) :
— Labor (*Main-d'oeuvre*) :
a) Circle-weeding and fertilizer application (*Sarclage des ronds et application d'engrais*) = P 1.00 /hr ; *b*) Harvesting (*Récolte*) = P 1.00/1 000 nuts (*noix*) ; *c*) Copra making (*Fabrication du coprah*) = P 150.00/t of copra (*de coprah*).
— Fertilizer (*Engrais*) :
1) Price of ammonium sulfate — 50 kg/bag (*/sac*) (*Prix du sulfate d'ammonium*) = P 52.35/bag (*/sac*) ; 2) Price of KCl — 62.5 kg/bag (*/sac*) (*Prix du KCl*) = P 71.52/bag (*/sac*).
— Copra price used (*Prix pratiqué pour le coprah*) : P 1.50/kg.
(2) Blanket application of (*Application en surface de*) : 0.40 kg N/tree/year (*/arbre/an*).
(3) Split application every six months (*Application fractionnée tous les 6 mois*).

yield paralleled that of the leaf P, K, Ca and Mg levels (Table VIII). Although not statistically significant, concentrations of these elements decreased slightly with the application of 4 kg KCl/tree annually and tended to rise again with 8 kg KCl treatment. Why such fluctuation in concentrations occurred could not be easily explained but somehow it might be responsible for such inconsistencies in copra yield.

Leaf nutrients.

Leaf analysis revealed that Cl levels significantly increased with increasing rates of KCl (Table VIII). Likewise, KCl fertilization improved the leaf nutrient levels of N, K and S. On the other hand, Mg content was not significantly reduced even at higher KCl levels of 4 and 8 kg/tree, suggesting that the soil (a typical extensive inland-upland soil of Davao) has adequate supply of Mg and K, as supported by the soil analysis (Table I). This may be the reason why no K-Mg antagonism occurred which is commonly observed in soils with low capacities of supplying these elements. It appears that for coconuts, 0.45 m. e. K and 5.3 m. e. Mg in the soil is adequate and the problem of K-Mg antagonism is not likely to occur even with high and long-term KCl fertilization.

Coefficient of correlation was highly significant between leaf Cl content and nut and copra production per nut or per tree, while no correlation existed between these yield component characters and leaf K. Also positive correlations were observed between these yield parameters and leaf N and S. This suggests that inland coconuts are generally deficient not only in N and Cl but also in S. Stepwise multiple regression analysis showed that 55.5 p. 100 of yield improvement in terms of nut during the fifth year was due to Cl, 9.5 p. 100 to S, 7.0 p. 100 to P and 4.3 p. 100 to N. On copra weight per nut, 74.3 p. 100 was contributed by Cl, 6.0 p. 100 by S and 2.8 p. 100 by N. On copra production per tree, 80.3 p. 100 was due to Cl, 8.7 p. 100 to S, 4.8 p. 100 to N and 3.3 p. 100 to Ca. All the other elements analyzed contributed only two percent or below on the three yield components observed. This substantiates the common observation at the Davao Research Center that the improvement in copra production is due to the Cl and not to the K component of KCl fertilizer.

Moreover, the results strongly indicated that the critical or adequate leaf chlorine level is 0.50-0.55 p. 100 (leaf 14) for bearing palms. Earlier, Ollagnier and Ochs [1971] proposed that for high yields of oil palm and coconut, leaf levels of 0.5-0.6 p. 100 appear to be necessary.

Economics of fertilizer usage.

Table IX shows that a maximum net return of P 26.52 per tree per year (or about P 4,136.37/ha/yr) was realized from KCl fertilization of 2 kg/tree/year which also gave the highest return of P 2.47 per peso invested. Increasing the KCl level to 8 kg produced a net return of P 27.77, an increase of only P 1.25 over the 2 kg KCl treatment. The return per peso invested was P 1.85 or P 0.25 less than the control. Consequently, the increase in net profit with 8 kg KCl treatment was not commensurate to the increase in the amount of fertilizer applied.

RECOMMENDATION AND CONCLUSION

Inland coconuts which are commonly observed to have much lower yields than those found along the coastal areas can be improved through proper fertilization with the aid of leaf analysis.

Findings of this long-term study indicate that Cl is the most likely limiting factor for coconut production especially in inland areas of Davao. In effect, copra yield was markedly correlated with Cl leaf levels ($r = + 0.89$), whereas no relation existed between yield and K levels. In addition, KCl fertilization increased the leaf nutrient levels of N and S which were both correlated with yield, suggesting the need for the application of these two nutrients for inland coconuts.

Hence, to supply these nutrient elements, an effective fertilizer is the combination of KCl as source of Cl and $(NH_4)_2SO_4$ as source of N and S at the rate of 2 kg and 1.5 to 2 kg, respectively, per tree per year. This recommended rate of KCl is based mainly on the economics of its usage and its effecs on Cl nutrition rather than its effect on coconut production. This is so, as beyond 2 kg KCl level of fertilization, production increases lag behind cost. On the other hand, below 2 kg KCl rate, the Cl requirement of the palm is being compromised.

Based on 5-year production average, the increase in leaf Cl level from 0.04 to 0.55 p. 100 resulted in yield increase of 10.98 kg/tree or 1.713 tons/ha annually, an additional income of P 1,950 under the 1977 price situation.

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RÉSUMÉ

Étude de la fumure en KCl des cocotiers sur les terres de l'intérieur à Davao (Philippines).

R. Z. MARGATE, S. S. MAGAT, L. M. ALFORJA et J. A. HABANA, *Oléagineux*, 1979, **34**, N° 5, p. 235-242.

De 1972 à 1977, des études ont été menées sur l'effet à long terme de la fumure en KCl des cocotiers producteurs. C'est avec une fumure de 2 kg de KCl/arbre/an, que l'on obtient la meilleure production de noix. Mais, si le poids de coprah/noix a augmenté proportionnellement à un accroissement de la teneur en KCl, la production de coprah/arbre n'a pas suivi une courbe régulière. Ainsi, les taux de KCl qui ont donné le meilleur rendement de coprah/arbre ont été, par ordre décroissant : 8, 2, 4, 1 et 0 kg. Le seuil critique de Cl dans la feuille (rang 14) a été estimé à 0,50-0,55 p. 100. Il existe une corrélation très étroite entre la teneur en Cl de la feuille et le rendement en noix et en coprah, alors qu'il n'y a aucune corrélation entre ce rendement et la teneur en K de la feuille. L'apport de KCl a également amélioré la nutrition en azote (N) et en soufre (S) des cocotiers, l'un comme l'autre étant en outre liés au rendement. Compte tenu des prix en 1977, le taux de 2 kg de KCl s'est avéré être le plus économique et celui qui donne le meilleur rapport par peso investi.

RESUMEN

Estudio del abonado con KCl de los cocoteros tierras adentro en Davao (Filipinas).

R. Z. MARGATE, S. S. MAGAT, L. M. ALFORJA y J. A. HABANA, *Oléagineux*, 1979, **34**, N° 5, p. 235-242.

De 1972 a 1977 se estudió el efecto a largo plazo del abonado con KCl de los cocoteros productores. Un abonado de 2 kg de KCl por árbol y al año, es el que permite lograr la mejor producción de nueces. Sin embargo, si bien el peso de la copra por nuez aumentó en forma proporcional al aumento del contenido de KCl, la producción de copra por árbol no siguió una curva regular. Así los niveles de KCl que produjeron el mejor rendimiento de copra por árbol han sido los siguientes por orden decreciente : 8 kg, 2 kg, 4 kg, 1 kg y 0 kg. El umbral crítico de Cl en la hoja (rango 14), se estimó en 0,50-0,55 %. Hay una correlación íntima entre el contenido en Cl de la hoja y el rendimiento de nueces y copra, y en cambio no hay ninguna correlación entre tal rendimiento y el contenido en K de la hoja. El aporte de KCl mejoró también la nutrición de nitrógeno (N) y azufre (S) de los cocoteros, estando ambos elementos vinculados con el rendimiento. Considerando los precios en 1977, el nivel de 2 kg de KCl resultó ser el más económico y el que más producía por peso invertido.