RESPONSE OF PHIL 2009-0919 TO VARYING LEVELS OF NPK FERTILIZATION IN GUIMBALAON SANDY CLAY LOAM SOIL (Ratoon Crop)

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ABSTRACTS/SUMMARY

The study was conducted at SRA-LGAREC, La Granja, La Carlota City from April 2022 to April 2023 to evaluate the response of Phil 2009-0919 ratoon crop to varying levels of Nitrogen, Phosphorus, and Potassium fertilization in Guimbalaon sandy clay loam soil. Each set of experiment had four treatments replicated four times and arranged in a randomized complete block design. The treatments consisted of four levels of fertilization for each set: 0, 75, 150, and 225 kg N/Ha; 0, 75, 150, and 225 kg P_2O_5/Ha; 0, 60, 120, and 180 kg K_2O/Ha.

Cane and sugar yields of Phil 2009-0919 were significantly influenced by Nitrogen fertilization. The highest cane yield was obtained at 150 kg N/Ha (93.11 TC/Ha) was comparable to 225 kg N/Ha but, significantly higher than 75 and 0 kg N/Ha. In like manner, the highest sugar yield of 229.04 LKg/Ha was observed at 150 kg N/Ha, and likewise, comparable to 225 kg/N/Ha, and significantly higher than 75 and 0 kg N/Ha. The unfertilized control gave significantly lower yield.

Phil 2009-0919 were not significantly influenced by varying Phosphorus fertilization rates. Cane yield of the ratoon crop ranged from 56.88 – 85.19 TC/Ha; while, the sugar yield ranged from 107.90-218.87 LKg/Ha.

Keywords: Phil 2009-0919, Varying levels of NPK fertilization, Guimbalaon Sandy Clay Loam

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OBJECTIVE

To evaluate the growth and yield response of Phil 2009-0919 to varying levels of Nitrogen (N), Phosphorus (P), and Potassium (K) fertilization.

METHODOLOGY

The study was conducted in Guimbalaon sandy clay loam soil at SRA-LGAREC in April 2022 and harvested in April 2023.The experiments on nitrogen (N), phosphorus (P), and potassium (K) requirements of Phil 2009-0919 were laid out, each with four(4) treatments replicated four(4) times and arranged in randomized complete block design (RCBD). The experimental plots measured 6 rows, spaced 1.3 meters apart, x 9 meters long.

Fertilizer treatments were divided in two doses. The P requirements were applied full dose at planting together with one half of N and K. The remaining one half of N and K were applied along the off-barred sides of the cane rows(side-dressing) two months after planting (MAP).

Selected three-eyed seedpieces of Phil 2009-0919 were planted at four (4) canepoints per linear meter.

SRA cultural practices for the growing of sugarcane were followed. Canes were harvested twelve (12) months after planting. Soil samples were taken before and after cropping for analysis.

Agronomic and harvest data were collected at random from the four middle rows of each plot.

The treatments used in the study are as follows:

Nitrogen series (kg N/Ha)	Phosphorus series (kg P_2O_5/Ha)	Potassium series (kg K_2O/Ha)
1. **0**-75-60	1. 150-**0**-60	1. 150-75-**0**
2. **75**-75-60	2. 150-**75**-60	2. 150-75-**60**
3. **150**-75-60	3. 150-**150**-60	3. 150-75-**120**
4. **225**-75-60	4. 150-**225**-60	4. 150-75-**180**

RESULTS AND DISCUSSION

The analysis of the soil used in the study is shown in Table 1. Guimbalaon soil is sandy clay loam, slightly acidic with a pH of 6.08, medium in organic matter, and high in phosphorus, potassium, calcium, and magnesium.

Table 1. Analysis of the experimental area before cropping

Soil Properties	Analysis/Recommendation
pH	6.08
O.M. (%)	2.78
P (ppm)	61
K (ppm)	767
Ca (ppm)	6366
Mg (ppm)	508
Texture	Sandy Clay Loam (SCL)
Fertilizer Recommendation	140-35*-60* kg/Ha NPK (*maintenance dose)

Influence of nitrogen (N) on cane yield (TC/Ha), rendement (LKg/TC) and sugar yield (LKg/Ha) of Phil 2009-0919 plant cane.

Table 2 shows the influence of N on sugar rendement, cane yield and sugar yield of Phil 2009-0919 plant cane.

Cane and sugar yields of Phil 2009-0919 plant cane were not significantly influenced by Nitrogen fertilization. Though not significant, the highest cane yield of the plant cane was 98.41 TC/Ha obtained at 225kg N/Ha. Similarly, the highest sugar yield of 230.40 LKg/Ha was observed at 225 kg N/Ha.

LKg/TC, on the other hand, is comparable among N fertilization rates. Values range from 2.29-2.34LKg/TC in the PC.

Table 2. Sugar rendement (LKg/TC), tonnage (TC/Ha), and sugar yield (LKg/Ha) of Phil 2009-0919 as influenced by varying nitrogen rates

N SERIES TREATMENT (Kg/Ha)	LKg/TC	TC/Ha	LKg/Ha
0-75-60	2.29	86.54	196.71
75-75-60	2.31	86.76	201.72
150-75-60	2.30	93.11	229.04
225-75-60	2.34	90.41	220.40
Mean	2.31	90.42	209.16
	ns	ns	ns
C.V. (%)	5.32	15.03	16.43

ns - not significant

Influence of nitrogen on stalk length, stalk diameter, weight per stalk and number of millable stalks of Phil 2009-0919

The average stalk length, stalk diameter, weight per stalk and number of millable stalks of Phil 2009-0919 are reflected on Table 3.

The nitrogen fertilization did not significantly influenced the stalk weight, length, diameter and number of millable stalks of the plant cane. The heaviest stalks of the plant cane was observed at 225 kg N/Ha(1.46). Although not significant, longer stalks were observed at (350.05); bigger stalks (2.79); heaviest stalks (1.46) and the most number of millable stalks (316.50) were observed at 225 kg N/Ha.

Table 3. Stalk length, stalk diameter, weight per stalk and number of millable stalks of Phil 2006-2289 as influenced by varying nitrogen rates

N SERIES TREATMENT (Kg/Ha)	Stalk length, cm.	Stalk diameter, cm.	Weight per stalk, kg.	Number of millable stalks
0-75-60	327.00	2.67	1.40	289.75
75-75-60	326.12	2.63	1.40	289.75
150-75-60	346.22	2.65	1.43	293.50
225-75-60	350.05	2.79	1.46	316.50
Mean	337.35	2.69	1.42	297.38
	ns	ns	ns	ns
C.V. (%)	7.26	2.74	15.03	15.99

ns - not significant

Influence of nitrogen on plant height and number of tillers per stool of Phil 2009-0919

The significant influence of N fertilization is manifested on the early growth parameters of Phil 2009-0919 (Table 4). Generally, N-treated plants are significantly taller and have more tillers per stool than the untreated.

Significant results were obtained from 3MAP tiller count, 3 and 6 MAP plant height except for tiller count at 6MAP of Phil 2009-0919 Nitrogen fertilization. The most number of tillers and tallest at 3MAP was observed at 75 kg N/Ha at 5.95 and 52.52 cm, respectively. For 6MAP, the most number of tillers(4.33) and tallest(225.74cm) Phil 2009-0919, were obtained at 225 kg N/Ha.

Table 4. Plant height and number of tillers per stool of Phil 2009-0919 as influenced by varying nitrogen rates

N SERIES TREATMENT (Kg/Ha)	Tiller(3MAP)	Plant Height(MAP)	Tiller(6MAP)	Plant Height(MAP)
0-75-60	3.35b	43.48b	4.28	193.20b
75-75-60	5.95a	52.52a	4.23	219.21a
150-75-60	5.50a	52.33a	4.23	220.25a
225-75-60	5.42a	49.55a	4.33	225.74a
Mean	5.06	49.47	4.26	214.60
	*	*	ns	*
C.V. (%)	11.46	6.52	20.31	6.13

*Means with a common letter are not significantly different ($LSD_{.05}$)
ns - not significant

Influence of phosphorus (P) on cane yield (TC/Ha), rendement (LKg/TC) and sugar yield (LKg/Ha) of Phil 2009-0919

As shown in Table 5, sugar rendement, cane and sugar yield of Phil 2009-0919 are not significantly influenced by varying levels of P fertilization. Cane yield of the plant cane ranged from 86.48-94.27 TC/Ha, while, sugar yield ranged from 209.04-242.36 LKg/Ha.

Table 5. Sugar rendement (LKg/TC), tonnage (TC/Ha), and sugar yield (LKg/Ha) of Phil 2009-0919 as influenced by varying phosphorus rates

P SERIES TREATMENT	LKg/TC	TC/Ha	LKg/Ha
150-**0**-60	2.50	86.48	232.91
150-**75**-60	2.39	92.36	220.08
150-**150**-60	2.43	94.27	209.04
150-**225**-60	2.57	87.27	242.36
Mean	2.47	191.51	226.10
	ns	ns	ns
C.V. (%)	5.73	9.15	9.28

ns - not significant

Influence of phosphorus on stalk length, stalk diameter, weight per stalk and number of millable stalk of Phil 2009-0919

The insignificant influence of P on yield of Phil 2009-0919 are manifested on the yield parameters (Table 6). Average length, diameter, weight, and number of millable stalks are comparable among varying P rates.

Table 6. Stalk length, stalk diameter, weight per stalk and number of millable stalk of Phil 2009-0919 as influenced by varying phosphorus rates

P SERIES TREATMENT (Kg/Ha)	Stalk length, cm.	Stalk diameter, cm.	Weight per stalk, kg.	Number of millable stalks
150-**0**-60	313.33	2.66	1.25	349.00
150-**75**-60	322.58	2.75	1.30	333.50
150-**150**-60	338.20	2.69	1.30	312.50
150-**225**-60	324.12	2.64	1.26	350.50
Mean	324.56	2.68	1.28	336.38
	ns	ns	ns	ns
C.V. (%)	6.52	4.34	9.15	11.00

ns - not significant

Influence of phosphorus on plant height and number of tillers of Phil 2009-0919

No significant differences were observed at tiller count of 3 and 6 MAP and plant height at 3 MAP, except for plant height at 6 MAP which gave significant result.

Though not significant, the highest number of tillers and the tallest at 3MAP was observed at 225 kg P/Ha at 6.30 and 49.95 cm, respectively.

The tallest plant height for 6MAP was obtained at 150 kg P/Ha (224.05), followed by 75 kg K/Ha (220.75) and the lowest was observed at 0 kg P/Ha(192.10).

Table 7. Plant height and number of tillers of Phil 2009-0919 as influenced by varying phosphorus rates

P SERIES TREATMENT (Kg/Ha)	Tiller(3MAP)	Plant Height(3MAP)	Tiller(6MAP)	Plant Height(6MAP)
150-**0**-60	5.58	46.98	5.05	192.10b
150-**75**-60	6.28	46.98	4.75	220.75a
150-**150**-60	5.78	49.28	5.25	224.05a
150-**225**-60	6.30	49.95	4.65	212.48ab
Mean	6.06	48.29	4.26	214.60
	ns	ns	ns	*
C.V. (%)	14.69	11.89	13.99	6.42

*Means with a common letter are not significantly different ($LSD_{.05}$)
ns - not significant

Influence of potassium on cane yield (TC/Ha), rendement (LKg/TC) and sugar yield (LKg/Ha) of Phil 2009-0919

Similar to P fertilization, Table 8 showed the insignificant influence of potassium (K) fertilization on sugar rendement, cane yield and sugar yield of Phil 2009-0919.

Except for sugar rendement, the highest TC/Ha and LKg/Ha were observed at 120 kg K/Ha at 99.52 and 252.00, respectively.

Table 8. Sugar rendement (LKg/TC), tonnage (TC/Ha), and sugar yield(LKg/Ha) of Phil 2006-2289 as influenced by varying potassium rates

K SERIES TREATMENT	LKg/TC	TC/Ha	LKg/Ha
150-75-**0**	2.60	75.04	195.23
150-75-**60**	2.54	90.79	230.36
150-75-**120**	2.52	99.52	252.00
150-75-**180**	2.53	97.75	247.11
Mean	2.55	90.77	231.17
	ns	ns	ns
C.V. (%)	3.14	17.04	18.00

ns - not significant

Influence of potassium on stalk length, stalk diameter, weight per stalk and number of millable stalk

The insignificant observations on yield of Phil 2009-0919 among varying levels of potassium (K) are manifested on stalk length, stalk diameter, weight per stalk and number of millable stalks (Table 9). Values are comparable regardless of rates applied.

Table 9. Stalk length, stalk diameter, weight per stalk and number of millable stalks of Phil 2009-0919 as influenced by varying potassium rates

K SERIES TREATMENT (Kg/Ha)	Stalk length, cm.	Stalk diameter, cm.	Weight per stalk, kg.	Number of millable stalks
150-75-**0**	297.55	2.62	1.17	299.50
150-75-**60**	307.12	2.55	1.31	325.00
150-75-**120**	322.73	2.57	1.26	370.50
150-75-**180**	314.30	2.71	1.29	355.75
Mean	310.43	4.87	1.26	337.69
	ns	ns	ns	ns
C.V. (%)	7.15	2.61	17.04	9.77

ns - not significant

Influence of potassium on plant height and number of tillers of Phil 2009-0919

No significant results were obtained from plant height and tiller count both for the 3MAP and 6MAP applied with varying levels of potassium fertilization.

Table 10. Plant height and number of tillers of Phil 2009-0919 as influenced by varying potassium rates

K SERIES TREATMENT (Kg/Ha)	Tiller(3MAP)	Plant Height(MAP)	Tiller(6MAP)	Plant Height(MAP)
150-75-**0**	5.40	49.50	5.00	186.35
150-75-**60**	5.30	50.90	4.45	179.45
150-75-**120**	5.22	49.82	5.23	191.30
150-75-**180**	5.37	47.60	5.78	191.25
Mean	5.32	49.46	5.11	187.09
	ns	ns	ns	ns

C.V. (%)	12.49	11.67	16.52	7.30

ns - not significa

Post-harvest soil analysis of the experimental plots

The soil analysis after cropping of Phil 2009-0919 (Table 11) showed comparable results in all series of fertilization. This indicates that the applied fertilizers at varying rates had no residual amount for the succeeding ratoon crop.

Table 11. Soil analysis of the experimental area after cropping of Phil 2009-0919

Soil Properties	Analysis/Recommendation (N treatment)	Analysis/Recommendation (P treatment)	Analysis/Recommendation (K treatment)
pH	6.13	6.02	6.24
O.M. (%)	3.43	2.97	2.91
P (ppm)	53	34	40
K (ppm)	453	524	503
Ca (ppm)	2,176	2,070	2,404
Mg (ppm)	123	123	126
Texture	Sandy Clay Loam (SCL)	Sandy Clay Loam (SCL)	Sandy Clay Loam (SCL)

Cost and benefit analysis of NPK fertilization of Phil 2009-0919

As reflected in Table 12, Phil 2009-0919 plant cane obtained highest net benefit when fertilized with 225 kg N/Ha over the other N rates.

Table 12. Cost, benefit analysis and return of investment(ROI) of Nitrogen fertilization of Phil 23009-0919 Plant cane

Treatment	Treat-ment cost (Php)	Yield (LKg/ Ha)	Planter's share (64%)	Composite price	Gross benefit	Net benefit	ROI
0-75-60	75,594.82	196.71	125.89	1,950.00	245,494.08	169,899.26	224.75
75-75-60	87,675.82	201.72	129.10	1,950.00	251,746.56	164,070.74	187.13
150-75-60	96,517.82	207.79	132.99	1,950.00	259,321.92	162,804.10	168.68
225-75-60	107,098.82	230.40	147.46	1,950.00	287,539.20	180,440.38	168.48

The highest net benefit from phosphorus fertilization of Phil 2009-0919 under Guimbalaon sandy clay loam soil condition was obtained at 0 kg P_2O_5/Ha (Tables 13). Increasing the rates of phosphorus reduces the net benefit for 75 and 150 kg P_2O_5/Ha but slightly increase on 225 kg P/Ha.

Table 13. Cost, benefit analysis and return of investment(ROI) of Phosphorus fertilization of Phil 23009-0919 Plant cane

Treatment	Treat-ment cost (Php)	Yield (LKg/ Ha)	Planter's share (64%)	Composite price	Gross benefit	Net benefit	ROI
150-**0**-60	87,966.32	232.91	149.06	1,950.00	290,671.68	202,705.36	230.44
150-**75**-60	97,320.32	220.08	140.85	1,950.00	274,659.84	177,339.52	182.22
150-**150**-60	104,805.33	209.04	133.79	1,950.00	260,881.92	156,076.59	148.92
150-**225**-60	117,074.82	242.36	155.11	1,950.00	302,465.28	185,390.46	158.35

In like manner as P, Phil 2009-0919 plant cane obtained the highest net benefit at 120 kg K_2O/Ha (Tables 14).

Table 14. Cost, benefit analysis and return of investment (ROI) of Potassium fertilization of Phil 2009-0919 Plant cane

Treatment	Treat-ment cost (Php)	Yield (LKg/ Ha)	Planter's share (64%)	Composite price	Gross benefit	Net benefit	ROI
150-75-**0**	86,158.32	195.23	124.95	1,950.00	243,647.04	157,488.72	182.79
150-75-**60**	96,770.82	230.36	147.43	1,950.00	287,489.28	190,718.46	197.08
150-75-**120**	104,926.32	252.00	161.28	1,950.00	314,496.00	209,569.68	199.73
150-75-**180**	109,406.82	247.11	158.15	1,950.00	308,393.28	198,986.46	181.88

CONCLUSION AND RECOMMENDATION

Phil 2009-0919 plant cane grown in Guimbalaon sandy clay loam soil and fertilized with 225 kg N/Ha in combination with P and K gave the highest yield of 98.412 TC/Ha, and 230.40 and LKg/Ha, respectively. The highest net benefit was likewise obtained at 225 kg N/ha.

Phil 2009-0919 plant cane, on the other hand, gave the highest net benefit at 0 kg P_2O_5/Ha in combination with N and K_2O. Increased P_2O_5/Ha fertilization to 225 kg gave comparable yield results to 0 P_2O_5/Ha but decreased in 75 and 150 kg. The net benefit was lowered as P kg/ Ha increased.

Phil 2009-0919 plant gave the highest net benefit at 120 kg K_2O/Ha. Increasing K_2O rate to 60, 120, and 180 kg K_2O/Ha gave comparable cane and sugar yields but slightly higher than 0 kg K_2O/Ha and obtained higher net benefits.

LKg/TC of Phil 2009-0919 was not significantly influenced by varying levels of N, P, and K fertilization.

Based on the results, Phil 2009-0919 plant cane should be fertilized with 225 kg N/Ha, 225 kg P_2O_5/Ha, and 120 kg K_2O/Ha for maximum production in Guimbalaon sandy clay loam soil condition.

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