YIELD PERFORMANCE PHIL 2009-1969 AND PHIL 2009-0919 AT DIFFERENT SEASONS OF PLANTING

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ABSTRACT

A study was conducted at the La Granja Agricultural Research and Extension Center, La Granja, La Carlota City, from October 2021 to May 2023 to determine the yield performance of Phil 2009-1969 and Phil 2009-0919 at different seasons of planting. The varieties were planted in October (early planting), February (middle planting), and May (late planting).

Yield performance of test varieties in terms of sugar rendement (LKg/TC), tonnage (TC/Ha), and sugar yield (LKg/Ha) significantly varies when canes are planted during early and late planting seasons. In early season planting, obtained a significantly higher sugar yields (297.78 LKg/Ha) regardless of the variety, and Phil 2009-0919 (287.54 LKg/Ha) got the highest yield, followed by check variety 8013 (287.15 LKg/Ha) and Phil 2009-1969 (264 LKg/Ha), respectively. The sugar content of canes was significantly influenced by the seasons of planting; the early season of planting maintained the highest tonnage (134.44 TC/Ha) compared to the middle and late planting season; however, Phil 2009-0919 obtained the highest tonnage with 122.17 TC/Ha.

No significant variations among yields of test varieties were observed on LKg/TC, although there were no significant differences, the check variety yielded the highest (2.37 LKg/TC), followed by Phil 2009-0919 (2.35 LKg/TC), and Phil 2009-1969 (2.28 LKg/TC), respectively. On the other hand, significantly higher yields were obtained during the late season of planting with 2.56 LKg/TC compared to early (2.24 LKg/TC) and middle planting (2.23 LKg/TC.).

Keywords: Planting season, tonnage, sugar yield, sugarcane, variety.

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INTRODUCTION

Sugarcane breeding is a continuous process aimed at producing new high-yielding varieties (HYV). It takes 10-12 years for breeders to produce varieties that are high-yielding and resistant to major diseases. During the selection process, a promising clone is subjected to rigid screening, such as a preliminary yield test, ecological and disease screening.

As the varieties are expected to gain interest among stakeholders, the entries from the 2009 series were subjected to a variety by season of planting trial, which is one of a series of agronomic tests for HYV. The timing of planting, ratooning, and harvesting influences the productivity of the sugarcane cycle. It is necessary to quantify these effects, both within and outside the current harvest season, to optimize crop cycle productivity and harvest season length, Wolde, Z. et al. (2014). In a study conducted by several researchers on the effect of planting season on the growth and yield of sugarcane, they found out that sugarcane varieties perform best in specific planting seasons (E.L. de la Cruz et., 1981; Villariez, 1994). Cerbo et al, 1985, observed that the highest average tonnage was observed in October and the lowest in April. Furthermore, the planting dates have a higher effect on sugarcane yield than on ripening, sucrose content levels differ during the harvesting season, the last phase of the sugarcane cycle has higher sucrose accumulation rates (Alexander, A.G., 1973). In addition, sugarcane ripening involves a complex combination of climate variables, genetic potential, and cultural management (Cardozo, Nilceu Piffer, and Sentelhas, Paulo Cesar, 2013). Therefore, there is a considerable variation in the planting dates and optimum planting periods in different countries (Bella et al., 2008).

This paper provides information about the yield production of the Phil 2009 series at different planting seasons. This will help the farmers in their decision-making pertaining to the planting of the said varieties.

OBJECTIVES

1. The study aimed to evaluate the yield performance of sugarcane HYV's from the Phil 2009 series at different seasons of planting.
2. To find out the ideal planting season for Phil 2009-1969 and Phil 2009-0919.

METHODOLOGY

Experimental Site, Design and Treatments

The study was conducted at the La Granja Agricultural Research and Extension Center, La Granja, La Carlota City, from October 2021 to May 2023. Three sets of layouts were set up adjacent to each other. The first set was planted in October (early season), the second set was in February (middle season), and the last was in the month of May (late season). The layout followed a 3x2 factorial in a Randomized Complete Block (RCB). The season of planting was designated as factor A, and factor B were the test varieties. The plot size was set at 6 rows by 9 meters in length and replicated three times. Each treatment and replication were separated by gaps.

Test Varieties, Rate of Seeding and Cultural Practices

There were two entries from the 2009 series, namely: Phil 2009-1969 and Phil 2009-0919. Three eye cuttings of each variety were used as planting materials. The seeding rate followed the 4 lacsas, or 40,000 canepoints per hectare recommendation. Fertilization was done on a split application of recommended rates of fertilizers based on soil analysis for N, P, and K. The first application was done one month after planting (1.5 MAP) and the last dose was applied three months after planting (3 MAP). Hand weeding was done to minimize plant-weed competition and ensure easy field operation during harvesting. Cultivation using carabao-drawn implements was employed. Trichogramma strips were applied to control borers in the early stage of cane growth, while rat baits were used for rodent control on the stalk elongation to maturity stage.

Harvesting, Data Gathering and Analysis

Canes were harvested in the months of October, February, and May when the canes were 12 months old. At harvest, canes from four middle rows were cut close to the ground; detopped, detrashed and the number millable stalks and plot weight were obtained. Ten representative samples were crushed and juices extracted were brought to the Soils laboratory for analysis. Data gathered were consolidated and analyzed using STAR Nebulla statistical software.

TEST VARIETIES

Phil 2009-0919

High in tonnage
Medium to high in sucrose
Very sparse flowering observed
Resistant to smut; resistant to downy mildew, yellow spot, and intermediate resistant to leaf scorch

Phil 2009-1969

High in tonnage
High in sucrose
Sparse flowering observed
Resistant to smut, downy mildew, yellow spot and intermediate resistant to leaf scorch

RESULTS AND DISCUSSION

Weather data showed that the month of October 2022 had the highest rainfall, while the highest temperature was recorded during the months of April to May 2023; furthermore, the lowest rainfall and lowest humidity were observed during the month of March 2023, on the other hand, a longer sunshine duration was higher during April 2023, while the same trend of sunshine duration was observed during the months of November 2022, March 2023, May 2023.

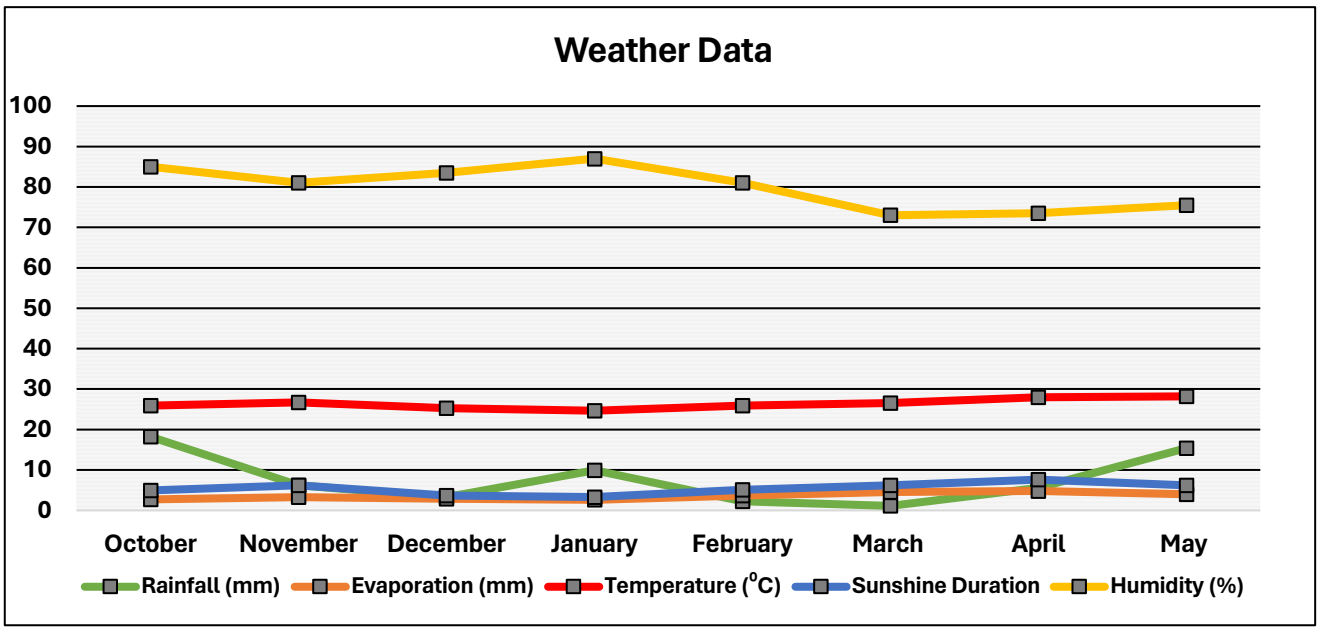

Fig. 1. Average rainfall, evaporation, temperature, relative humidity and sunshine duration from the month of October 2022 to May 2023.

Average length of the stalk. As shown in Table 1, significantly longer stalks were observed in the early planting season, with an average of 362.82 cm, comparable to middle planting with an average of 347.02 cm, but significantly higher compared to late planting with a 324.85 cm stalk length. Although there were no significant differences were observed between the varieties, Phil 8013 had the highest varietal mean of 344.47 cm, while the lowest varietal mean of 342.75 cm was recorded on Phil 2009-1969. No interactions were observed among planting seasons and varieties.

Table 1. Average stalk length (cm) of Phil 2009-1969 and Phil 2009-0919 at different seasons of planting.

Variety	Planting Season			
	Early	Middle	Late	Variety Mean
Phil 2009-1969	372.27	345.80	310.17	342.75
Phil 2009-0919	366.15	357.82	318.42	347.46
8013	350.05	337.42	345.95	344.47
Planting Season Mean	362.82a	347.02a	324.85b	
Planting Season - *	CV (a) – 5.11%		* - significant at 5% level	
Variety -ns	CV (b) – 7.57%		ns – not significant	

Means with the same letter case are not significantly different from each other.

Average stalk diameter. The average diameter of 10 stalk samples as influenced by different seasons of planting is presented in Table 2. A significant difference was observed in planting season: canes harvested at middle planting had a bigger diameter with an average of 2.74 cm, comparable to early planting with an average of 2.61cm and late planting with 2.45 cm.

Although not significant on varieties, the biggest diameter was observed on Phil 2009-0919 with an average of 2.63 cm and gave almost the same result to other varieties. Interactions between planting season and variety were also not significant.

Table 2. The average stalk diameter of Phil 2009-1969 and Phil 2009-0919 at different seasons of planting.

Variety	Planting Season			
	Early	Middle	Late	Variety Mean
Phil 2009-1969	2.59	2.54	2.49	2.54
Phil 2009-0919	2.50	2.76	2.64	2.63
8013	2.76	2.92	2.20	2.62
Planting Season Mean	2.61a	2.74a	2.45b	
Planting Season - *	CV (a) – 6.47%		* - significant at 5% level	
Variety - ns	CV (b) – 11.64%		ns – not significant	

Means with the same letter case are not significantly different from each other.

Average number of millable stalks. As shown in Table 3, millable stalks significantly differed among planting seasons. Early planting season obtained a significantly higher number of stalks with an average of 375.58, higher than middle planting (297.00) and late planting (257.25). Although there were no significant differences in varieties, the highest millable stalks were observed in Phil 2009-0909, followed by Phil 2009-1969, and Phil 8013, respectively. Furthermore, no significant interaction was observed between variety and season of planting.

Table 3. Average number of millable Stalks per plot of Phil 2009-1969 and Phil 2009-0919 at different seasons of planting.

Variety	Planting Season			
	Early	Middle	Late	Variety Mean
Phil 2009-1969	360.75	303.25	242.75	302.25
Phil 2009-0919	380.00	322.50	275.00	325.83
8013	254.00	265.25	386.00	301.25
Planting Season Mean	375.58a	297.00b	257.25c	
Planting Season – *	CV (a) – 10.89%		*-significant at 5% level	
Variety - ns	CV (b) – 14.23%		ns- not significant	

Means with the same letter case are not significantly different from each other.

Average LKg/Ha. Sugar yield (LKg/Ha) significantly differs among seasons of planting. The highest sugar yield was obtained during the early season of planting, with an average of 297.78 LKg/ha, closely comparable to the late season of planting, with 297.08 LKg/Ha, followed by the middle season (244.09 LKg/Ha), respectively. Phil 2009-0919 (287.55 LKg/Ha), obtained the highest sugar yield comparable with the check variety Phil 8013 (287.55 LKg/ha). Phil 2009-1969 had the lowest value with 264.24 LKg/Ha. No significant differences were observed among varieties in middle and late planting.

Table 4. Average sugar yield (LKg/Ha) of Phil 2009-1969 and Phil 2009-0919 at different seasons of planting.

Variety	Planting Season			
	Early	**Middle**	**Late**	**Variety Mean**
Phil 2009-1969	287.03	236.19	269.52	264.24
Phil 2009-0919	304.38	244.64	313.62	287.55
Phil 8013	301.93	251.44	308.10	287.15
Planting Season Mean	297.78a	244.09b	297.08a	
Planting Season – *	CV (a) – 8.08%		* - significant at 5% level	
Variety – ns	CV (b) – 12.73%		ns – not significant	

Means with the same letter case are not significantly different from each other.

Average ton of cane. Significant differences were observed on canes planted in the early season. Phil 2009-0919 (122.17 TC/ha) outperformed other varieties, followed by the check variety 8013 with 121.84 TC/ha; however, Phil 2009-1969 had the lowest tonnage with 116.09 TC/Ha. Cane yield was comparable between middle and late planting. The higher tonnage obtained from Phil 2009-0919 could be attributed to the high number of millable stalks obtained. Furthermore, the result shows that no significant interactions were observed between planting season and variety.

Table 5. Average Ton Cane (TC/Ha) of Phil 2009-1969 and Phil 2009-0919 at different seasons of planting.

Variety	Planting Season			
	Early	**Middle**	**Late**	**Variety Mean**
Phil 2009-1969	128.96	108.75	110.56	116.09
Phil 2009-0919	130.90	111.59	124.02	122.17
Phil 8013	143.47	109.27	112.78	121.84
Planting Season Mean	134.44a	109.87b	115.79b	
Planting Season - *	CV (a) – 8.56%		* - significant at 5% level	
Variety – ns	CV (b) – 12.87%		ns - not significant	

Means with the same letter case are not significantly different from each other.

Average LKg/TC. Sugar content of canes was significantly influenced by the season of planting but not variety. Canes planted and harvested during the late season were significantly higher compared to early and middle planted canes, with an average of 2.56 LKg/TC, followed by the middle season of planting (2.23 Lkg/TC), and the lowest LKg/TC were recorded at the early planting season (2.24 LKg/TC). The result could be attributed to the longer duration of sunshine and the maximum temperature recorded during March to May 2020. Cardozo et al. (2013) concluded that water restriction has a direct effect on increasing sucrose in the stalk through active accumulation mechanism and an indirect effect on stalk dehydration, making the ripening process more intense than under the influence of low temperatures. However, no significant interaction on varieties with the highest LKg/TC was obtained by check varieties Phil 8013 (2.37 LKg/TC). No significant interactions were observed among planting seasons and varieties.

Table 6. Average LKg/TC of Phil 2009-1969 and Phil 2009-0919 at different seasons of planting.

Variety	Planting Season			
	Early	Middle	Late	Variety Mean
Phil 2009-1969	2.26	2.17	2.43	2.28
Phil 2009-0919	2.35	2.19	2.52	2.35
8013	2.10	2.30	2.73	2.37
Planting Season Mean	2.24b	2.23b	2.56a	
Planting Season - *	CV (a) – 5.61%		* - significant at 5% level	
Variety - ns	CV (b) – 10.83%		ns – not significant	

Means with the same letter case are not significantly different from each other.

Average juice maturity test. Table 6 shows the brix, pol, and purity of the test varieties. The season of planting significantly influenced the variables. The percent brix was significantly highest on late-planted canes (21.40%). Middle season planting obtained the lowest data (18.50%). The same trend was observed on the percent pol; the late planting registered the highest with 20.25%. For purity, late-planted canes had the significantly highest value of 94.61. Results for middle and early planting were comparable.

Table 7. Table of means for Juice Maturity test of Phil 2009-1969 and Phil 2009-0919 at different seasons of planting.

Treatment Seasons of Planting	% Brix	% Pol	App. Purity
Early	20.45b	18.34b	89.54b
Middle	18.50c	17.55b	95.39a
Late	21.40a	20.25a	94.61a
Season*Var			
CV(a)	2.61%	4.26%	2.11%
Varieties			
2008-1969	19.73	18.33	93.23
2009-0919	20.20	18.81	93.33
8013	20.39	18.98	92.96
Season*Var			
CV (b)	6.53%	8.96%	3.14%

Means with the same letter case are not significantly different from each other.

SUMMARY AND RECOMMENDATION

The study was conducted to evaluate the yield performance and find out the ideal planting seasons for Phil 2009-1969 and Phil 2009-1919.The lay-out and planting were done in the months of October 2021, February 2022, and May 2022. Canes were harvested at 12 months old. The design followed the factorial in a randomized complete block (RCB) replicated three times.

Yield data on stalk length, diameter, millable stalk, plot weight, tonnage (TC/Ha), sugar rendement (LKG/TC), sugar yield (LKG/HA), and juice maturity test were gathered and evaluated.

Significantly longer stalks were observed in the early planting season, with an average of 362.82 cm compared to the middle and late planting season. No interactions were observed among planting seasons and varieties.

Stalks diameter significantly differed among planting seasons. The middle planting season obtained a significantly larger number of stalks with, an average of 2.74 cm, comparable to the early planting season but significantly higher than the late

planting season (2.45 cm). Varieties have no significant effect on the variable. Furthermore, no significant interaction was observed between variety and season of planting.

Sugar yield (LKg/Ha) significantly differs among seasons of planting. Early planting season (297.78 LKg/Ha) obtained significantly the highest sugar yield, comparable to late planting season (297.08 LKg/Ha). The middle planting season had the lowest value, with 244.09 LKg/Ha.

Significant differences were observed on canes planted in the early season. Phil 2009-0919 (122.17 TC/Ha) outperformed other varieties. Harvested cane yield (TC/Ha) at the early season of planting was significantly higher compared to the middle and late planting.

The sugar content of canes was significantly influenced by the season of planting but not by variety. Canes planted and harvested during the late season were significantly higher compared to early and middle planted canes, with an average of 2.56 LKg/TC.

Season of planting significantly influenced the per cent brix, % pol, and purity of the test varieties variables. The percent brix was significantly highest on late planted canes (24.40%). Middle season planting obtained the lowest data (18.50%). The same trend was observed on % pol with late planting registered 20.25%. For purity, middle planted canes had the significantly highest value of 95.39.

Based on the results of the study, Phil 2009-0919 performed best during early and late planting, while Phil 2009-1969 performed best during the early planting season. Planting test varieties in the season where they perform best for maximum yield potential is recommended.

Additionally, in order to ascertain the agronomic response of the variety and its suitability for various locations and planting seasons, test varieties must also be carried out in other areas.

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