

Luzon Agricultural Research and Extension Center (LAREC)

- Cane and Sugar Yields as Affected by Percent Germination (February 2014 – March 2015)

Significantly higher number of tillers and millable stalks were produced at 100% germination. TC/Ha at 100% was comparable with 80-95 % and significantly higher than that of 75. Percent loss in yield decreases from 75% to 95%.

Sugar yield in LKg/TC was not significantly affected by percent germination. Sugar yield in LKG/Ha was significantly lowered at 85%. Percent sugar yield loss decreases from 75 to 95%.

The results have shown the increase in yield losses with increase in percent canepoint germination which is an important parameter in the conduct crop loss estimation.

- Cane and Sugar Yield as Affected by Detrashing (February 2014 – March 2015)

The experiment was conducted in Randomized Complete Block Design in two factorial, using two varieties, Phil 99-1793 and Phil 00-2569 and treated with non-detrashing and detrashing at nine months after planting (MAP) with trashes either left along the furrows or removed in the field.

The six treatments gave comparable length and diameter of millable stalks and cane yield (tons cane/hectare) and sugar yields (LKg/TC and LKg/Ha). Although the cane and sugar yields tend to increase with detrashing of stalks, the differences with non-detrashing were not significant.

It appears from the results that while detrashing contribute to enhanced harvesting of clean cane and other benefits it does not improve the yields.

- Cane and Sugar Yields as Affected by Lodging (November 2013 – March 2015)

The experiment was conducted in Randomized Complete Block Design in two factorial, using three varieties, Phil 93-1601, Phil 99-1793 and Phil 00-2569 and subjected to natural lodging and control of lodging with bamboo-supported and propped canes on the eight month.

The three treatments without support lodged but heavy rains and winds that passed during the year was not enough for the lodged canes to touch the ground. The six treatments with support were prevented from lodging.

The means of the nine treatments did not significantly differ on cane yield (tons cane/ha) and sugar yields (LKg/TC and LKg/Ha). Likewise, means of lodged canes and bamboo supported and propped canes were comparable. Variety means significantly differ on LKg/TC and LKg/Ha. This shows that lodging without touching the ground and without stalk breakage would not affect the yields.

- 2010 Preliminary Yield Test (April 2014 – June 2015)

Thirty test clones from 2010 row test series were entered in the preliminary yield test at LAREC using RCBD to compare their agronomic and yield potential with two check varieties, Phil 8013 and Phil 7544.

Based on sugar yield, three clones gave significantly higher sugar yield than Phil 7544 and comparable with Phil 8013, one was comparable to both check varieties, 13 were comparable to Phil 7544 but significantly lower than Phil 8013. All other test entries were significantly lower than both check varieties. The clones were also rated resistant to smut and downy mildew. All clones were sparse flowering.

The clones which are recommended to undergo ecological testing are Phil 10-4-0149, Phil 10-5-0183,, Phil 10-36-0427, Phil 10-12-0131, Phil 10-9-0107, Phil 10-48-0645, Phil 10-40-0545, Phil 10-6-0085, Phil 10-61-0955 and Phil 10-73-0901.

- Screening of Phil 2009 series for resistance to smut (May 2013 – June 2015)

Thirty clones of the 2009 series were planted and tested for their reaction to sugarcane smut in the plant and ratoon canes.

Among the thirty clones of 2009 series, twenty four clones were rated very highly resistant, namely, Phil 09-0015, 09-0037, 09-0081, 09-0093, 09-0125, 09-0249, 09-0323, 09-0539, 09-0691, 09-0919, 09-1045, 09-1141, 09-1145, 09-1261, 09-1295, 09-1437, 09-1483, 09-1821, 09-1867, 09-1943, 09-1955, 09-1985, 09-2145 and 09-2147. Phil 09-1963 and 09-1969 were rated highly resistant; Phil 09-1597 was resistant; Phil 09-0097, 09-0863 and 09-1567 were intermediate resistant.

- Screening of Phil 2008 series for resistance to downy mildew (July 2013 – June 2015)

Twelve clones of Phil 2008 series were screened and evaluated for resistance to sugarcane downy mildew in the plant and ratoon canes.

Among the twelve clones of 2008 series, Phil 08-1123 was rated highly resistant; Phil 08-0161 and Phil 08-1957 were rated intermediate resistant; Phil 08-0909, Phil 08-1175 and Phil 08-1891 were intermediate average. Six clones were rated very highly susceptible, namely, Phil 08-0129, Phil 08-0155, Phil 08-0553, Phil 08-0747, Phil 08-1231 and Phil 08-1253.

- Ratoon performance of recommended Phil 2000 – 2001 series varieties (November 2011 – June 2015)

Recommended varieties from 2000-2001 series, Phil 00-1491, Phil 00-2569, Phil 00-1419, Phil 00-1893, Phil 01-0577 and Phil 80-13 and Phil 75-44 as check varieties were planted using RCBD to evaluate their ratoon performance.

Phil 00-2569 has the highest tonnage comparable with other varieties except with Phil 00-1893 which has significantly the lowest yield in the plant cane. In the first and second ratoon, respectively, Phil 00-1419 and Phil 7544 had the highest yields. All varieties decreased in the first and second ratoon except Phil 00-1419 which increased in the first ratoon. Phil 8013 has the highest average percent decrease of 25.22 while Phil 00-1893 has the lowest with 8.82.

Phil 80-13 has the highest sugar rendement in the plant cane and first ratoon while Phil 00-1893 has the highest yield in the second ratoon. Phil 00-1419 has significantly the lowest yield from plant cane up to the second ratoon. Only Phil 00-1419 and Phil 01-0577 did not decrease in yield in both ratoons. Phil 00-1419 has the highest average increase of 5.48% while Phil 7544 has the highest decrease of 9.67.

Phil 00-2569 has the highest sugar yield in the plant cane and first ratoon while Phil 01-0577 has the highest in the second ratoon. All varieties decreased in the first and second ratoon except Phil 00-1419 which increased in the first ratoon. Phil 8013 has the highest average percent decrease of 26.99 while Phil 00-1893 has the lowest with 9.44.

All test entries increased in ROI in the first and second ratoon compared to plant cane. Phil 8013 performed best among the test varieties in the ratoon while Phil 00-1419 performed the least. All test entries are profitable to maintain up to the second ratoon at 85 percent stool survival.

- Ratoon performance of recommended Phil 2005 series varieties (February 2012 – June 2015)

Two recommended varieties from the ecological test of Phil 2005 series, Phil 05-55 and Phil 05-483 were observed in two ratoon crops to determine their ratooning capacity. The ratoon performance of Phil 75-44, a commercial variety with good ratooning capacity, was also observed.

In TC/ha, all the varieties decreased in the first and second ratoon.

In LKG/TC, Phil 05-0055 and Phil 75-44 increased in the first and second ratoon. Phil 05-483 increased in the first ratoon but decreased in the second ratoon.

The LKG/ha of Phil 05-55 and Phil 05-483 decreased in the first and second ratoon. Phil 75-44 increased in the first ratoon but decreased in the second ratoon.

In the first and second ratoon respectively, Phil 05-55 had a Return on Investment (ROI) of 2.10 and 3.27, Phil 05-483 had 2.13 and 2.95 while Phil 75-44 had 2.63 and 3.03.

Based on the result of ROI, Phil 05-55 and Phil 05-483 are still profitable to maintain up to the second ratoon at percent stool survival of 76.66 and 76.67 respectively.

- Ratoon performance of recommended varieties from Ecological Test of Phil 2006 series (February 2013 – May 2015)

Two recommended varieties from the ecological test of Phil 2006 series, Phil 05-1763 and Phil 02-0421 were observed in two ratoon crops to determine their ratooning capacity. The ratoon performance of Phil 75-44, a commercial variety with good ratooning capacity, was also observed.

In TC/ha, Phil 05-1763 and Phil 02-0421 decreased in the first and second ratoon. Phil 7544 increased in the first ratoon but decreased in the second ratoon.

In LKG/TC, Phil 05-1763 and Phil 75-44 increased in the first ratoon but decreased in the second ratoon while Phil 02-0421 decreased in both ratoons.

In LKG/ha Phil 05-1763 and Phil 02-0421 decreased in the first and second ratoon. Phil 75-44 increased in the first ratoon but decreased in the second ratoon.

In the first and second ratoon respectively, Phil 05-1763 had a Return on Investment (ROI) of 2.21 and 0.90, Phil 02-0421 had 1.64 and 1.20 while Phil 75-44 had 2.59 and 1.35.

Based on the result of ROI, only Phil 02-0421 is still profitable to maintain up to the second ratoon at percent stool survival of 55.75.

- Cane and Sugar yields as affected by Flowering (November 2013 – May 2015)

The ½ hectare area planted to Phil 99-1793 to be used for collecting stalk samples produced almost negligible flowering stalks that it was no longer used for the study. Two areas planted with first ratoon canes of Phil 00-2569 and Phil 99-1793 and ratooned on April 20, 2014 and March 27, 2014, respectively, were instead used for sampling.

In each sampling date, stalk samples without flower, stalks on stage of tassel initiation and stalks with emerged flowers were randomly collected in three locations in each area. The stalks were weighed and crushed and the juices were analysed in the laboratory.

For Phil 00-2569, stalks were sampled from 7 mos + 11 days to 12 mos + 9 days for a total of 16 sampling periods. LKg/TC of stalks without flower generally increased from the 1st sampling period of 1.56 to the last sampling period of 2.18. The same trend was observed for stalks on stage of tassel initiation till the 12th sampling periods and for stalks with emerged flowers till the last sampling period. On the average, stalks on tassel initiation and with emerged flowers had lower LKg/TC.

On stalk weight average, stalks without flower were higher with 1.47 kg compared with stalks on tassel initiation of 1.25 and emerged flower of 1.24.

For Phil 99-1793, 12 sampling periods were done from 8 mos + 7 days to 12 mos + 12 days. For stalks without flowers, the LKg/TC tend to increase from the 12 sampling periods from 1.92 to 2.23. Stalks on stalk initiation was slightly lower with 1.89 at the start and reached 2.19 on the on the 6th sampling period, after which no more samples were collected. Stalks with emerged flowers showed higher LKg/TC (2.00) at the start and afterwards fluctuated from 1.93 to 2.25 till the 12th sampling period.

On stalk weight, stalks without flower generally produced lighter stalks on the first six sampling periods which later increased till the last sampling period. Stalks with flowers were heavier on the first six sampling periods which later on decreased on the 7th to the last sampling period. Stalks with and without flowers had comparable average LKg/TC.

La Granja Research and Extension Center (LGAREC)

Variety Improvement and Pest Management (VIPM)

- The Phil 2014 Series Breeding Program produced 284 arrows from 202 bi-parental crosses using 62 female and 57 male selected parents.
- In the Single Seedling Pilot Test for Phil 2013 Series, 907 promising clones from 181 bi-parental crosses were selected as entries to the Row Test.
- In the Row Test of Phil 2012 series, 247 promising clones from 171 crosses were selected, propagated under Multiplication I and tested for smut. One hundred forty four (144) clones were found resistant to the disease. Two hundred (200) clones were propagated under Multiplication II and tested for downy mildew.
- For Phil 2011 series, all clones out tested were found resistant to downy mildew and recommended for further multiplication and testing. The top 30 clones were considered entries to the Preliminary Yield Test, further propagated, verified for reaction to smut and simultaneously screened for leaf scorch and yellow spot diseases.
- For Phil 2010 series, smut test at PYT stage showed that 12 clones in the plant cane and 12 clones in the ratoon rated resistant to the disease; 20 clones were resistant to leaf scorch and 6 clones were moderate to yellow spot.
- The following selected clones from the Preliminary Yield Test for Phil 2010 Series were considered as entries to the Ecologic Test; Phil 2010-4-0149, Phil 2010-38-0487, Phil 2010-9-0107, Phil 2010-48-0645, Phil 2010-6-0077, Phil 2010-42-0385, Phil 2010-12-0105, Phil 2010-81-0733, Phil 2010-26-0353, and Phil 2010-73-0901.
- In the Ecologic Test Phil 2008 Series, Phil 2008-0909, Phil 2008-0161 and Phil 2008-1355 were the promising varieties among the 10 entries in the plant cane. The three varieties are high in tonnage and sucrose content. Phil 2008-0909 performed best in Bais, La Carlota and Passi Mill Districts with an average yield of 108.36' 2.13 LKg/TC and 230.88 LKG/ha. Phil 2008-1355 also performed in these districts with an average yield of 88.23 TC/ha 2.20 LKg/TC and 194.06 LKg/ha. Phil 2008-0161 in Bais and La Carlota Mill districts had yields of 98.79 TC/ha, 2.04 LKg/TC and 202.33 LKg/ha. Flowering was not observed during the test. Phil 2008-0909 and Phil 2008-0161 are moderately resistant to smut and highly resistant to downy mildew, leaf scorch and yellow spot. Phil 2008-1355 is highly resistant to smut, downy mildew and leaf scorch but moderate to yellow spot.

- One thousand two hundred ninety (1,290) sugarcane accessions were planted in the Germ plasm Collection as of December 31, 2015. Eight (8) new Phil varieties from the Ecologic Test were added to the collection. Eight hundred twenty one (821) clones/varieties were partially characterized according to number of millable stalks, brix reading, stalk diameter and leaf width.
- The Genome Project to increase productivity, profitability, sustainability and global competitiveness in the sugar industry was renewed for its 3rd year of implementation. Isolation and analysis of DNA from sugarcane samples is still going on. Seven potential sugarcane parental were already identified. Molecular characterization of entries will start in the first quarter of 2016 upon the arrival of specific markers from UPLB.
- Pollination, Sowing and Seedling Care, Phil 2014 Series

During the 2014 breeding season, flowering of parental clones and varieties was late and of short duration with peak of full emergence observed on the last week of October to first week of November 2014.

Pollination work which started October 2016 and ended November 27, 2014, utilized 62 female selected parents. A total of 284 arrows from 202 biparental cross combinations were pollinated. From these, 277 arrows form 198 biparental crosses were harvested with three arrows destroyed.

The sowing of fuzz in 202 seedboxes from November 18 to December 16, 2014 resulted in the germination of seedlings in 198 biparental crosses consisting of 277 arrows. Medium to very good germination was observed in 77.27 percent of the crosses. Overcrowded seedlings in 84 biparental crosses were pricked in 330 seedboxes.

Seedlings in 528 seedboxes were given proper care and management like regular watering, fertilization, spraying of insecticides and fungicides, trimming of leaves, weeding and cultivation prior to transplanting in June and July 2015.

- Propagation I, Phil 2011 Series

Thirty promising Phil 2011 series clones from the Preliminary Yield Test were planted and propagated in SRA-LGRAEC from April 2015 to October 2015 in preparation for Propagation II. The canepoints produced were further propagated to increase number of planting materials needed for Ecologic test in different locations nationwide.

- Multiplicaton I, Phil 2012 Series

Two hundred forty seven Phil 2012 Series clones selected from Row Test 2012 were multiplied (Multiplication I) and simultaneously tested for smut. Multiplication I was laid out and planted in January 2015. Care and maintenance of sugarcane plants were done based on SRA cultural practices. One hundred eighty clones were selected for Multiplication II and Downy Mildew screening in August 2015 based on their agronomic and morphological characteristics. Multiplication I, Phil 2012 series started in January 2015 and ended in November 2015.

- Downy Mildew Resistance Test, Phil 2011 Series (Plant Cane and Ratoon)

Two hundred Phil 2011 series clones selected from the first multiplication stage of the sugarcane variety Improvement Program were evaluated for their resistance to downy mildew disease of sugarcane. The test was laid out in September 2014 to November 2015 following the natural method of infection under La Granja conditions. The method consisted of planting naturally infected canes or spreader rows. Seeds of sweet corn were drilled within the spreader rows to serve as additional source of infection. Result of the plant cane showed that 188 clones were rated very highly resistant, 8 highly resistant, 3 resistant and 1 intermediate resistant to the disease. In the ratoon crop, 156 clones were very highly resistant, 30 highly resistant, 9 resistant and 5 intermediate to the disease.

- SVIP Germplasm Collection, Characterization and Maintenance

A total of 1,295 sugarcane varieties were maintained in the Germplasm Collection for the year 2015. Ten new Phil varieties from the Ecologic Test Phil 2007 Series were added to the collection; however, fifteen (15) IPBGR accessions did not survive after replanting. 821 clones/varieties were partially characterized agronomically. Brix reading, flowering, stalk diameter and leaf width were the data gathered on the characterization to primarily provide necessary information for the selection of parent materials.

- Row Test 2012 Series

Row Test 2012 series was conducted in March 2014 to January 2015 as the 4th stage of the Breeding Program of SRA-LGAREC where 906 clones were selected from the crosses in Phil 2011 Single Seedling Plot Test. From these, 247 clones with good agronomic characteristics based on brix reading, average tiller per stool, average diameter, weight per stalk and lowering observation were selected for the next stage of the Breeding program, the Multiplication I and Disease Screening Stage.

PRODUCTION TECHNOLOGY AND CROP MANAGEMENT (PTCM)

Completed researches

- Comparative effect of rock phosphate from different sources in Negros Island on Yield of Sugarcane

Rock phosphate from different sources in Negros Island namely Toboso, Sipalay, Ilog, Escalante, San Carlos was used in a four years study as sources of phosphorous for growth and yield of sugarcane. The yearly application of rock phosphates from different sources gave comparable yields of Phil 2000-2569 compared with chemical fertilizers. Soil analyses results also showed similar results. The results imply the reliability of these areas as sources of rock phosphates which can reduce cost of production due to phosphorus.

- Effect of N enhancers on the Growth and Yield of Phil 99-1793 ratoons

No significant results on cane and sugar yields were obtained on two ratoons of Phil 99-1793 applied with the recommended rates of ordinary urea, coated urea at 105-70-60 NPK/ha and ordinary urea added with mycorrhiza. Increasing the rates of N to 185 kg/ha with constant P and K likewise produced non-significant results although the highest yield was observed on 145-70-60 per hectare and with the addition of mycorrhiza. These increases in yields should be equated with the added costs due to coating and mycorrhiza as yield enhancers.

- Effect of 18-6-0, Silicon and Boron Fertilizer on growth and yield of Phil 99-1793 ratoon

On the effect of micronutrients, the addition of 1 kg silicon/ha and 100 g Boron to the recommended rate of NPK improved the sugar rendement, cane and sugar yields of Phil 99-1793. The experiment was laid out on *Guimbalaon* soils. Verification trials should be conducted in other soil types.

- Yield performance of Phil 2004-1011 applied with different fertilization packages

Phil 2004-1011 subjected to either of the following fertilization packages gave higher benefits than the recommended rate of 140-105-60 NPK:

a. Recommended N + 25% of P from 18-46-0 + Recommended K + rock phosphate

- b. 75% N + Rock phosphate + Rec. K + 8 gals. BMO*
- c. 75% N+ Rock phosphate + Rec. K + 100 g. Boron*
- d. ½ NPK + 5 tons mudpress*
- e. ½ NPK + 5 tons/ha mudpress + 2 tons calcitic lime*
- f. ½ NPK + 5 tons/ha mudpress + 8 gals BMO+2 tons calcitic lime*
- g. 1 bags 18-6-0 + 4 bags Urea + 100 g Boron + 1 kg silicon*

The choice of the farmer on above packages would depend on availability of resources.

- Row Test 2012 Series

Row Test 2012 series was conducted in March 2014 to January 2015 as the 4th stage of the Breeding Program of SRA-LGAREC where 906 clones were selected from the crosses in Phil 2011 Single Seedling Plot Test. From these, 247 with good agronomic characteristics based on brix reading, average tiller per stool, average diameter, weight per stalk and flowering observation were selected for the next stage of the Breeding Program, the Multiplication I and Disease Screening Stage.

- Smut Resistance Test, Phil 2010 Series (PYT – Plant Cane & Ratoon)

Thirty clones selected from the Preliminary Yield Test were tested for resistance to smut disease. The trial was conducted from February – August 2014 for the plant cane, continued to first ratoon from September to February 2015. Test clones were soaked in smut spore suspension for 10 minutes and incubated for 48 hours prior to planting.

Result of the plant cane showed that 11 clones were resistant, 7 moderate and 12 were susceptible to the disease. In the ratoon, 5 clones were very highly resistant, 1 highly resistant, 2 resistant, 4 intermediate resistance, 6 intermediate average, 3 intermediate susceptible, 5 susceptible, 3 highly susceptible and 1 very highly susceptible to the disease.

- Yellow Spot Resistance Test, Phil 2010 Series

The trial was conducted from February 2014 to February 2015. Natural method of infection was effected by planting diseased clones in between 2 rows of test clones. Out of the 30 clones tested, 6 were moderate and 24 were susceptible to the disease.

- Leaf Scorch Resistance Test, Phil 2010 Series

The trial was conducted from February 2014 to February 2015 to determine the reaction of 30 Phil 2010 Series clones to leaf scorch. The method of infection employed was a combination of artificial and natural means. Disease reaction of the test clones was assessed 10 months after planting. Four clones were found very highly resistant, 6 highly resistant, 8 resistant, 2 intermediate resistant, 8 intermediate average, 1 intermediate susceptible and 1 highly susceptible to the disease.