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Sablot *(Litsea glutinosa),* Lour Rob., A Symbol of Ilocano Ingenuity in Construction

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ABSTRACT

This paper presents a unique Ilocano culture through the amazing nature of constructing antique houses and churches with the sablot leaves. The crude formulation of the original sablot paste was reconstituted to relate to the modern day context.

This study attempts to widen the Ilocano culture through the Ilocano built environment with the end view of enriching its present collection of subjects unfolding the Ilocano engineering using indigenous resources.

This study made use of a mixture of qualitative and quantitative type of research. Interview was the method of gathering information and the researcher conducted experiment based on what she learned from the interview on the use of sablot as paste.

Four major Ilocano values were deemed evident and highly associated with the indigenous construction material known as sablot. They are prudence (kinamanagsakbay), self-reliance (panagwayas), caring (panangilala), and ingenuity (kinawido).

The findings disclose four amazing discoveries: 1) The strength of the samples out of sablot paste are as strong as those of cement as binder. 2) There is an effect of soaking time to the strength of the sablot samples. 3) The strength of the grout and mortar for concrete hollow blocks using sablot paste as binder is as strong as the grout and mortar using cement. and 4) The plaster out of sablot paste is 35 percent lower in cost than the cement plaster, taking the area of application and thickness of the plaster similar for both.

Sablot trees were found still thriving in Vigan City, Sto. Domingo, and Sinait, all in Ilocos Sur. The presence of sablot trees within the Ilocos Region is still with a high percentage of probability, basing on the existence of the

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trees in the three municipalities of Ilocos Sur, owing to the fact that these places hove churches built using the sablot paste.

Key words: binder, *sablot* paste, cement, concrete, compression test

INTRODUCTION

Ilokandia possesses a rich culture in terms of literature, built environment or heritage sites, traits, customs, and traditions as manifested through its heart-warming native songs, rhythmic folk dances, and thought-provoking riddles. From an engineering point of view, culture is better appreciated from the legacy that its engineering and architecture show. An understanding of the grandeur of the Ilocos buried in its built environment would open up the nostalgic past to unveil the values of the Ilocano forebears. This way, the younger generations are provoked to appreciate and to imbue the values.

Like any other human being, the Ilocano recognizes himself to be the center of creation, given the freedom to subdue and to explore what God has offered him in this strip of land in Northwestern Philippines which he calls his own.

Noting the historical succession of colonizers, Ilocandia has transcended into a conglomeration of traits and values. However, when everything had settled, the Ilocanos survived to have set their identity as a tribe, and became a strong race of sturdy, strong-willed, frugal, and industrious people. It is through their collective effort that have established their niches everywhere in the world.

Long before cement was introduced, the Ilocanos were already constructing big churches, towers and houses made of bricks, lime, and clay. These materials were laid by means of a binder made of sablot paste, which was prepared by soaking sablot leaves in water. Sablot *(Litsea glutinosa)* is a tree belonging to the family Lauraceace that is growing extinct because it is already very rarely used. This is a group of plants exuding white and sticky sap from all parts of the plant organism called Latex {Rabena, et al., 2005). If the leaves are soaked in clean water for 3-7 days, they exude sticky substances so that when the solution is mixed with lime, sand, and molasses, the resulting mixture becomes plastic and fluid approaching the workability of concrete. Bricks, sand, lime molasses and sablot solution were the aggregates used during the construction of the 21 century-old Catholic churches of the province of Ilocos Sur and other structures with similar character anywhere in the Philippines. The researcher deeply believes that where the antique churches are,

so do sablot trees thrive. Otherwise, there could have been no sources of the indigenous material used during their construction.

This paper recounts sablot, an indigenous Ilocano construction material in association with the values imbued by the Ilocano.

Specifically, it gives a glimpse of yesteryears' building techniques, and tries to re-introduce the *sab/ot* for the purpose of environmental preservation and protection.

The !locos Region collectively known as Ilocandia, composed of the provinces of Ilocos Sur, Ilocos Norte, La Union, and Pangasinan, were ethnically found by the Spaniards as relatively peaceful, orderly, and prosperous. Their success was in their character- industrious, thrifty, and self-reliant (Navarro, et al., 2008).

The eco-frugality of the Ilokano, in its true sense, connotes moderation, sufficiency, and temperance. Many call it simplicity. It demands wise conservation of Earth's riches, elimination of waste through streamlined buying and consumption, ensuring product durability, reusing, recycling, and composting what would in the past end up in ugly garbage dumps. Eco-frugality is now serving as the corrective to an excessive, consumptive, and unsustainable lifestyle http://eco-stewards.i8.com/.

Figure 2. *A sablot tree (inset, the leaves and flowers.*

Sablot (Litsea Glutinosa) trees are distributed throughout the Philippines in secondary forests at low and medium altitudes. The common local names of the plant include *puso-puso* and *batikuling* in Tagalog, *sab/ot* and */amlamuyot* in Iluko. Its leaves are elliptical to oblong-elliptical, 9 to 20 cm long, broadly pointed at the base and tapering to a pointed tip. Flowers are small, yellowish, crowded in umbels in the axis of the opposite leaves. Fruits are rounded, 8 mm in diameter. The *sablot* leaves

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used to bind the aggregates of yesteryears. It is well documented that *sablot* leaves were used as binder together with lime and the aggregates in the construction of big structures such as churches in the Ilocos in the early 17005 (Florentino, 2000) which up to the present are still existing without major cracks and dilapidation. The Ilocano community has been provided a legacy of a rich culture vested in the old churches.

Basing from history and attested by the senior citizens of Ilocos Sur, *sablot (Litsea g/utinosa)* was used in the Ilocos Region as binder in building antique structures, particularly the churches which still stand today. Centuries ago, ancient builders used the solution where leaves of *Sablot* tree was soaked for days to bind bricks, sand, molasses, and lime for grouting, then in plastering the bricks.

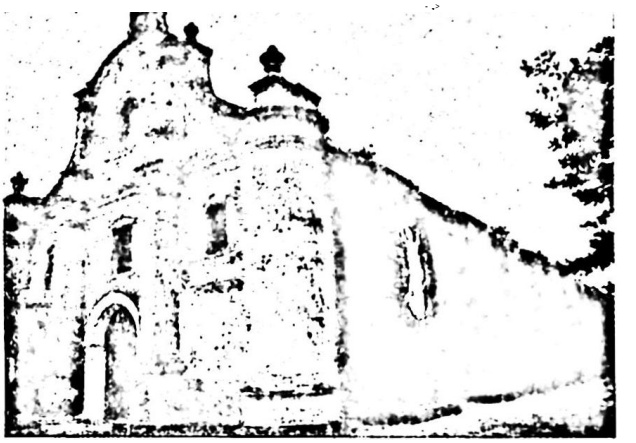

Figure 3. The Sta. Maria Parish Church, one of the baroque churches and enlisted as a World Heritage Site by UNESCO, was constructed using the *sablot* paste as binder

Msgr. Roque Reyes, Parish Priest of the St. Vincent Parish, San Vicente, Ilocos Sur and Archdiocesan Curator of Nueva Segovia, also attested that the *sablot* leaves soaked in water develop a sticky substance that blends well with the aggregates for grouting and plastering. He witnessed the *sablot* paste used in the repair of the Sta. Maria Church where he was once the parish priest. The Sta Maria church is one of the baroque churches-enlisted as one of the World Heritage Sites by UNESCO. He further attested that 21 churches of Ilocos Sur were built using the *sablot* as binder.

Conceptual Framework

This paper desires to establish a connection of some popular Ilocano values to the people's ingenuity in using the *sablot*, an indigenous material, to bind aggregates for the construction of ancient structures. The following values identified are:

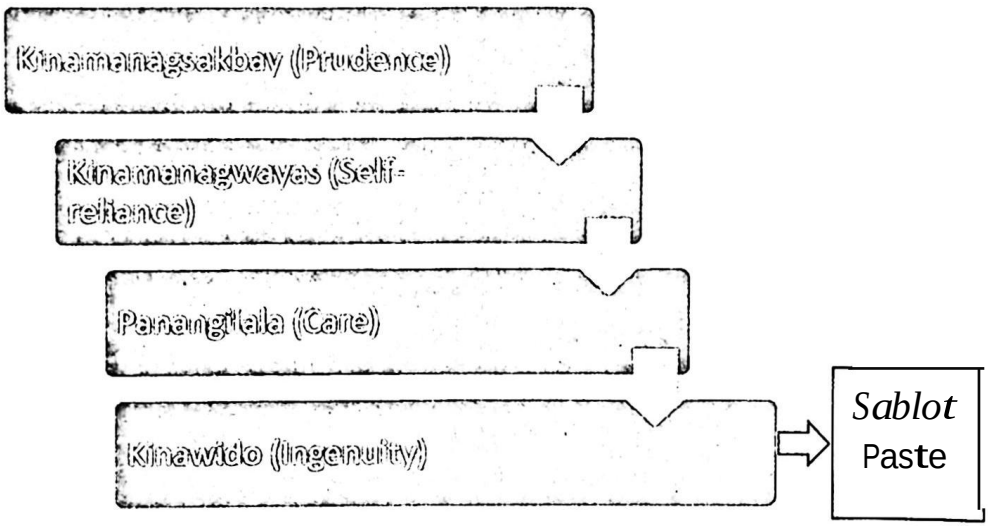

Figure 1. The Research Paradigm

Because the Ilocano sees the future in advance *(kinamanagsakbay),* sets his/her own boundaries for self-sufficiency *(kinamanagwayas),* and cares for Mother Earth as his/her home *(panangiala)* by his/her frugality and wise use of resources, both physically and financially, he discovered the *sablot* paste *(kinawido)* that have kept the churches' bricks, sand and lime in place to survive the elements for centuries.

METHODOLOGY

Research Design. This paper is both historical and experimental, moderately using a mixture of qualitative and quantitative style of conducting research. It recalls Ilocano indigeneous material, with the intention of exploring the possibility of adopting it again at this time of environmental degradation. The formulation of samples to replicate the original construction procedures resorted to the experimental mode of design.

Data Gathering Techniques. To tackle the study, the researcher used the interview method of gathering information on relevant Ilocano values and from which, she tried to construct samples of the *sablot* paste and had them tested for

compression to lay the possibility of promoting the use of the tree for binder purposes on the parameters of strength, soaking time, and costing comparisons.

The researcher tried to duplicate the procedure performed by people years back. To establish the control group, three cylindrical concrete samples, 6" in diameter, 12" long, were prepared for testing. To assess how *sablot* fares with the same size as the concrete cylinders, another three samples using sand and lime with *sablot* paste were constructed in two different variations: five samples (Group A) with the *sablot* paste three days old, and five samples (Group B} with the *sab/ot* paste six days old. The age of the *sablot* paste is the duration of its soaking time in water.

Another set of samples were constructed to check the reaction of the *sab/ot* mixture to the concrete. This was done by pouring the same mixture of sand and lime with *sablot* paste similar to the proportion in the cylindrical samples to the empty cells of concrete hollow blocks.

RESULTS AND DISCUSSION

A. Relevant Ilocano Values

Kinamanaqsakbay (Prudence). Prudence is the exercise of discretion, foresight, forethought, circumspection all at a time. It refers to the exercise of good judgment, common sense, and even caution, especially in the conduct of practical matters. Discretion suggests wise self-restraint. Foresight implies the ability to foresee and make provision for what may happen. Forethought suggests advance consideration of future eventualities. Circumspection implies discretion, as out of concern for moral or social repercussions.

Figure 4*. Owning a piece of land to till, a carabao for plowing and a cart for transportation is the Ilokano's strategy for self-reliance.*

For ages, our Ilocanos in Northern Luzon have been famous for their exceptional frugality, an aspect of prudence which requires control of one's self from unwise spending (http://ecostewards.18.com). *Panagkirmet* is a positive trait which other regions

misunderstand to being stingy *(kuripot).* Later, due to the dominance of modern consumptive lifestyle, the Ilocano frugality has been maligned and misread to be lack of generosity, and a harsh attitude toward the things of this world. And now, with the emergence of environmental awareness, frugality is becoming highly valued as an ecological virtue.

Since peope live in a finite planet, with the natural resources fast depleting by the minute, frugality becomes an expression of love and genuine concern for the future generation and an instrument to maintain the beauty, integrity and sustainability of the environment. It enables all life to thrive together by sparing and sharing of global goods.

Kinamanaqwayas (Self-reliance). *Panagbiag iti bukod a ling-et* is the passion of the genuine Ilocano, a person determined not to be a burden to another, confident to his/her own capabilities, judgment, or resources, and trying to be independent economically. A young couple would prefer to build a *nipa* hut where they raise their family by themselves. The principal obsession of an Ilocano is to build a stable economic security for his family. To almost all Ilocanos, the cornerstone of such security is a permanent guaranteed source of rice supply for the whole year. The Ilocanos do not subscribe to the "bahala na" attitude in life. (Navarro, et al, 2008)

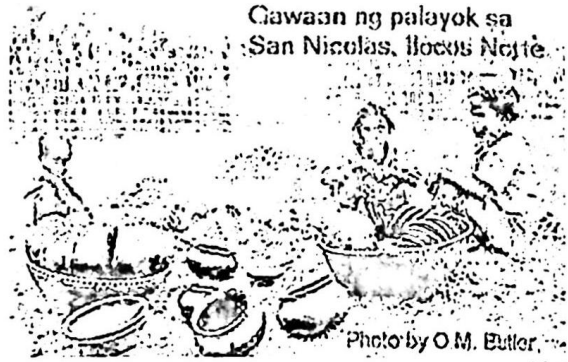

Figure 5. *Group-oriented Ilokano women, carving earthen jars for living (agdamili ti banga)*

Manangilala (Caring). Attributed to his prudence and frugality, the Ilocano is a caring being. He values everything that is contributory to his existence. The typical Ilocana would treasure cooking utensils, plates, blankets, especially clothings for special occasions. A genuine Ilocana could manage to keep her wardrobes to last for years and to make her personal belongings look new, despite the time these were kept in her *aparador* or *bout.* Her kitchen would show inverted bottles of gravies, like catsup, thick sauce, and the like, and in the closet for perfumes, lotions, shampoos, when their contents are almost drained to enable her to consume them to the last drop.

On the other hand, it is innate in the Ilocano to feel and exhibit concern and empathy for others, just as he values his own. Though individualistic, in a sense, because of his desire for self-sufficiency, he is a group-oriented being and cooperative. He shares what he has in the form of strength, money, harvests, domestic belongings to his neighbors- during weddings, house construction, important occasions, and most especially during odd times- death, calamities or epidemic.

The essence of community in the Ilocano is manifested while doing his home-based industries- group work during tobacco flu-curing preparations *(panaggatud, panagtudok, panagbad-ay),* planting and harvesting rice *(panagraep, panaggapas),* pottery *(panagdamili ti banga),* washing clothes in the river, collecting plates from neighbors during weddings and other occasions, then group-washing of dishes, thereafter.

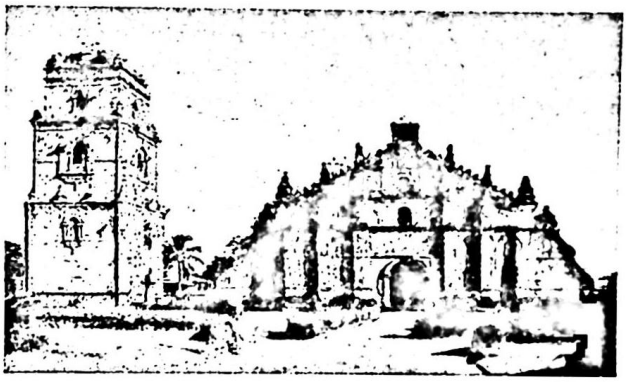

Figure 6. *The Paoay (Ilocos Norte) church, one of the old churches constructed using the sablot solution as binder.*

B. The Ilocano Ingenuity through the *Sablot* Paste

The Vigan Museum archives reveal that *sablot,* an indigenous material was used as binder in the construction of the Paoay Church, one of the oldest Ilocos churches. The construction started in 1704, and inaugurated in 1896, almost two centuries in the making. A binder creates the permanent bond in the aggregates: lime, sand, molasses and bricks. This is the role of cement- a construction breakthrough introduced some fifty years later in Great Britain by John Smeaton Joseph Aspdin, an English inventor, invented the Portland Cement in 1824, suggesting that while experiments on the cement were being done outside the country, the Ilocanos have perfected their *sablot* technology through the churches that were constructed during the 17'' and 18'' centuries- a showcase of the Ilocano ingenuity (Bellis, 2012).

Ingenuity is the quality of being inventive or resourceful (en.wikipedia.org). It is the process of applying ideas to solve problems or meet challenges. Ingenuity involves the most complex human thinking processes, to take advantage of opportunities or to overcome problems. It further requires the assessment of what is available in a certain context, then proceeds with a course of action. These processes interact with each other as ideas are tried, sometimes resulting to failures, hence starting all over again, modifying, then trying again until success is attained.

Taking together his prudence, self-reliance, and caring attitude, the Ilokano ingenuity is shaped. His shrewd ability to foresee the future, gauging from present-day trends, his determination to survive the odds no matter what, yet balanced by his sense of responsibility as steward of Mother Earth, the Ilokano forefathers discovered the potentials of the sablot leaves to bind aggregates together, and was able to build structures which they left as legacy to the whole Ilocandia.

As to who discovered the sablot leaves, how and when it was discovered, could not anymore be accounted in this study. This paper credits the sablot technology to Ilocano forefathers. As a race, they left behind something which will never be forgotten. Compared to what the construction industry has now, their method of extraction was crude and slow, but the effect is structurally sound and environment-friendly.

C. Sablot-related Experiments

Further illustrations on the ingenuity of the Ilocanos would be better appreciated by the succeeding discussions. Interviews conducted to document the binding capability of sablot reveal that the soaking period would take 3 to 7 days in big earthen jars at 5-8 cu ft capacity *(burnays* in Ilocano). First, the leaves were put inside the jars, then filled up with water until full of both water and leaves. The *sablot* solution would be taken to mix with the sand and lime aggregates. A proportion was followed, two parts sand, one part

Figure 7. A typical bumay where the sablot leaves were soaked in clean water centuries ago.

lime, 1 part *barisangsang, or* unprocessed sugar. (Reyes, 2012.)
If not enough, the water component would again be replenished as the original amount in the same duration before it could bind again. This was done for two to three times at most, depending upon the state of the leaves' decomposition.

Sablot's Strength

The potential of the leaves as binder was measured by conducting three (3) groups of samples: a) by gathering remnants of *sablot* and had them tested against compression; b) by constructing samples using two-parts sand, one-part lime with *sablot* paste.then tested their endurance against compression; and c) by discovering the sablot mixture's reaction with concrete.

Original Mixtures. Debris of the St. Dominic Church fence (Sto. Domingo, Ilocos Sur constructed in the 17" century, long before cement was introduced) were gathered when the parish demolished a part of its fence to provide space for a new office. The debris were interwoven with bricks, and grouted with sand and lime. Three of the bigger chunks demolished were chosen, shaped into rectangles then tested at the St. Louis University laboratory, Baguio City.

Table 1. Comparative f'_c values of samples using sablot and cement as binder.

Sample #	Sample Description, in	Binder	
		Sablot, MPa	Cement, MPa
1	1-3/4"x2-1/2"x6"	4.87	10.51
2	2-3/4"x3-3/4"x6"	22.12	11.86
3	2-3/4x3-1/2x7	9.82	10.31
Average		12.27	10.89
% Increase of Sablot as Binder over Cement		12.67%	

The samples extracted from a demolished antique fence in Table 1 had unequal areas and they reflected varying strengths. Sample 1 was the weakest, while Sample 2 was the strongest. The centuries-old debris were already disturbed samples. Due to the passage of time, the materials comprising the fence could have deteriorated unevenly, some parts have weakened, while there are other parts which are still strong. Because bricks were interwoven with lime and sand, sample #2, the strongest sample among the debris, could be possible to have the brick component still in tact, or a harder material like stone could have been part of the mixture, while the brick component in the other two samples have already deteriorated. This possibility could explain that the compressive strengths of the three samples which used *sablot* as binder were significantly different. Considering the age of the samples, the reflected compressive stresses in Samples 1 and 3 might already be their scrap values. The stresses in Samples 1 and 3 may be low, yet the strength could still be sufficient for residential purposes. How much more if the samples are at the height of their productive ages!

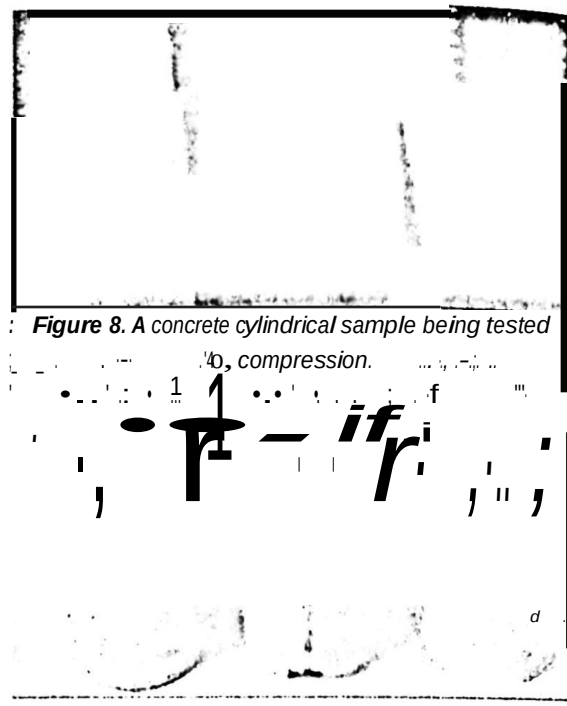

Figure 8. *A concrete cylindrical sample being tested in compression.*

Figure 9. *Cylindrical samples using sablot as binder.*

The concrete cylinders paired with the debris samples were molded from ungraded mixed aggregates hauled from the riverbanks of Banaoang, Santa, Ilocos Sur. This should explain why the compressive stress results were low in contrast to the lowest fc' used for concrete which is 17 MPa. The use of ungraded mixed aggregates was used to capture country-side construction which usually use ungraded mixed aggregates to make small bungalows or one-storey residential houses.

When the strengths of the samples made of sablot paste were compared to the strength of the concrete samples, a t-value of 0.267 was computed. This did not

attain significance at 0.05 probability level. (Please refer to Table 2). This then suggests that the fc' values of the samples out of *sablot* paste are as strong as those of cement as binder.

With the test results shown in Table 1 by the samples with *sablot* paste, vis-a-vis those ungraded mixed aggregates with cement, the *sab/ot* as binder even registered higher compressive stresses than the concrete cylinders molded from ungraded mixed aggregates. The researcher believes that *sablot* paste competes with the strength of cement as binder when used with bricks, lime, sand and molasses. However, the researcher wishes to clarify that the composition of the two sets of samples are different. The *sablot* samples are composed of lime, sand and molasses while the concrete is composed of cement and ungraded mixtures of sand and gravel.

Table 2. Independent samples test.

		t-test for Equality of Means		
		t	Sig. (2-tailed)	Mean Difference
fc'	Equal variances assumed	.267	.802	1.37667

The strength of concrete was just shown to provide the interested reader an idea on the strength of the *sablot* samples. The old Ilocos churches were made of 1-meter thick walls made of bricks, grouted with sand, lime and molasses with the *sablot* paste. The extra-ordinary wall thickness of the churches further provided the strength of the whole structure, since the walls acted as the footings, columns and beams entwined into just one structural member-the wall.

Reconstituted Mixtures vis-a-vis the Soaking Time. To gauge the sablot paste's applicability for today's aggregates, two sets of samples with *sablot* paste were made, this time with a reconstituted mixture of sand and lime only. The proportion adopted was patterned from the same proportion used centuries ago: two-parts sand, one-part lime. The *barisangsang* was not included. Instead of clean water, the *sablot* paste was used in the same manner as how proper water-cement ratio is observed in the modern concrete mixtures. The soaking time is the point of comparison. The samples in Group A are 216 days old, and were mixed with *sab/ot* paste where the leaves were soaked in clean water for three (3) days. Both sets of

specimen were molded in the conventional concrete cylinders, 6" in diameter, 12" long. The proportion of the leaves with the volume of water where the leaves were soaked was the same. To ten liters of clean water, a kilogram of the leaves was soaked.

Table 3. *Compressive strength of samples with soaking time, t, of sablot paste as variable.*

Sample #	*Group A, t=3 days*	*Group B, t=6 days*
	Fc', MPa (psf)	Fc', MPa (psf)
1	0.81 (16,884.6)	0.95 (19,802.9)
2	0.83 (17,301.5)	0.90 (18,760.7)
3	0.80 (16,676.2)	0.94 (19,594.5)
4	0.78 (16,259.3)	0.93 (19,386.0)
5	0.82 (17,093.0)	0.91 (18,969.0)
Average	0.808 (16,843.0)	0.926 (19,302.7)

The samples of Set B were 244 days old. The *sablot* paste where the leaves were soaked in clean water was six (6) days old. Table 3 also reveals the ultimate compressive stresses, fc' of the samples.

Evidently, the strength of the reconstituted *sablot* is barely 7.4 to 8.5% of the strength of concrete samples from ungraded mixed aggregates. When the strength of the reconstituted samples shown in Tables 3 and 4 were compared with the original

Figure 10. *A typical antique fence made of bricks*

mixture, even if older, they resisted heavier loads. This may be due to the presence of the bricks in the samples. Bricks were popular during the pre-cement times. They were made of clay, shaped into rectangles usually 2" thick, 2" wide, 4" long.

The results of the compressive tests show that the samples in Group B resisted relatively higher stresses than those in Group A. Apparently, the length of soaking time affects the strength of the resulting mixture.

When the fc' values of the two groups of samples using the soaking time of 3 days and 6 days as variable were analyzed, the t-value computed (t =-9.329) attained significance at .05 level. Therefore, the soaking time is significant. Please refer to Table 4.

Table 4. Independent samples test.

		t-test for Equality of Means			
		t	Sig. (2-tailed)	Mean Difference	t-prob
fc'	Equal variances assumed	-9.329	.000	-.11800	0.05

This suggests that the soaking time affects the strength of the samples. The samples in Group B molded using the sablot paste six (6) days old are stronger than those samples molded with sablot paste three (3) days old. It was observed further during the experiment that in three days time, the leaves soaked in water started to exude white sticky substances called latex. This reaction with water lasted only for seven (7) days, since all the latex are dissolved as the leaves start to disintegrate. The most sticky *sablot* paste occurred from the 3" to the 6" day. When mixed with sand and lime the resulting mixture became fluid and plastic, similar in appearance and manageability as the present-day concrete mixture. After the 7" day, the *sablot* solution loses its binding power.

Reaction with Cement. Another experiment was conducted to discover how the *sablot* paste reacts with cement. To do this, sand and lime in the same proportion as they were mixed in the cylinders, together with *sablot* paste were poured in as fillers to 5" thick concrete hollow blocks (CHB). Three (3) samples were made. The test results are shown on the second column of Table 5. Another three (3) samples of 5" concrete hollow blocks were filled with the regular concrete

aggregates to establish the control group. The test results are also shown in the third column. The compressive stresses of the ungrouted CHB samples were also measured. The values of the compressive stresses are shown in the fourth column of Table 5.

The aggregates comprising the fillers of the CHBs in the first column were one-part lime and two-parts sand, mixed with *sab/ot* paste, while the fillers of the CHBs in the third column were one-part cement, and seven-parts ungraded mixture of sand and gravel. Again, the choice of ungraded mixture of sand and gravel was done to capture the country-side practice of constructing one-storey low-cost residential houses.

Table 5. Comparative compressive strength of concrete hollow blocks with aggregates mixed with sablot paste and cement.

Sample #	Fc', MPa CHBw/ Sablot Paste	Fe', MPa CHBw/ Cement	F'c, MPa Ungrouted CHB
1	1.94	1.82	1.55
2	2.36	2.21	2.09
3	2.62	1.90	1.67
Ave	2.30	1.98	1.77

When the values of the fc' of the CHB samples filled with aggregates using the sablot paste were compared with the fc' values of those CHB samples filled with aggregates using cement as binder, the F-value computed was 2.741 which failed to attain significance at 0.05 level. This means that there are no significant differences in the fc' values of both groups. Table 6 shows the details of the one-way analysis of variance.

Table 6. Analysis of variance.

fc'	Sum of Squares	df	Mean square	F	Sig.
Between Groups	.440	2	.220	2.741	.143
Within Groups	Equal .481	6	.080		
Total	.921	8			

Seemingly, in Table 5, the CHBs filled with aggregates mixed with *sablot* paste registered higher compressive stresses than those filled with aggregates using cement as binder. But because there are no significant differences in the values reflected in both groups, then it suggests that the fillers of the 5" thk CHB molded with sablot paste are as strong as the fillers using cement as binder. This is an indication that *sablot* paste develops bond with cement. This finding suggests two possibilities: a) that cement and *sablot* paste may be combined; orb) that aggregates may be mixed with *sablot* paste using lesser cement.

Financial **Comparison Between Concrete and Sablot**

A better appreciation on the use of sablot because of the financial gain is presented subsequently using similar parameters for plastering a wall area. The wall thickness shall be set uniform at one inch on both sides (inside and outside). One bag of cement, two cu ft of sand (1:2) shall be the proportion of the concrete plaster and its area of coverage shall also be the wall coverage of the plaster using sablot as binder. The volume per mix is 0.085 cu.m. The coverage area for this volume of plaster is 1.8 sq.m. The sablot paste contains one part lime and two parts sand, practically yielding the same volume of mixture as the cement plaster and the same coverage of plastered area. Table 7 shows the comparative expenses of both.

The cement plaster uses an approximate volume of 25-30 liters of water to mix the aggregates for every bag of cement. The same volume of water is also the same volume of sablot solution needed to mix the aggregates in the preparation of the sablot plaster.

Table 7. Comparative financial requirements incurred for cement and sablot plaster.

a. Cement Plaster

Quantity	Unit Cost	Cement Plaster Components	Unit of Measure	Total
1	P 230.00	Portland Cement	bag	P 230.00
0.057	600.00	River sand	cu.m.	34.00
			Total	P 264.00

b. Sablot Plaster

Quantity	Unit Cost	Sablot Plaster Components	Unit of Measure	Total
0.5	P 275.00	Lime	bag	P 137.50
0.057	600.00	River sand	cu.m.	34.00
			Total	P 171.50

The computations shown in Table 7 show a significant decrease in the cost incurred with the sablot plaster by 35% per 1.85 sq.m. of wall area using current prices.

CONCLUSIONS

The Ilocano built environment that portrays the values nurtured by the forefathers. The Ilocano ingenuity is exemplified in the construction of the churches, founded by the values of prudence *(panagsakbay),* self-reliance *(kinamanagwayas),* and care *(panangilala).* The favorable results of the compressive tests of the reconstituted samples using sablot as binder signify its high feasibility of adoption; to wit: The sablot samples are as strong as the concrete samples, There is an effect of soaking time to the strength of the sablot samples, The strength of the grout and mortar for concrete hollow blocks using sablot paste as binder is as strong as the grout and mortar using cement, and The plaster out of *sablot* paste is 35% lower in cost than the cement plaster, taking the area of application and thickness of the plaster similar for both.

RECOMMENDATIONS

The use of *sablot* as an indigenous material is an outright compliance of the Renewable Energy Law of the Department of Energy. The government should promote its use to be consistent with the law it has promulgated as a form of energy-saving.

More in-depth experiments should be conducted to validate the results of this study.

The properties of sablot should be further studied to discover other possible handling strategies to make its utilization more practical.

The sablot-water proportions should be standardized to establish uniform formulation vis-a-vis the soaking time.

The younger Ilokano generations should be taught to live the values practiced by the forefathers so that the Ilokano culture is sustained.

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