



“Analysis of diversity and morphometry of intertidal marine molluscs in litoral transects of rocky zones of Ecuadorian Antarctic Station Pedro Vicente Maldonado” Phase I

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INTRODUCTION

Due to the renewed national and international interest in scientific exploration in the Antarctic, coupled with its biographical isolation over millions of years and pristine environmental status, it allows important discoveries and discoveries of new marine species, such as Molluscs: one of the most representative of ecological and economic importance. Currently, Latin American countries of the Antarctic Convention such as Chile and Argentina conduct systematic studies with marine molluscs; joined with national studies in other areas of Antarctica (Cruz, 1990, Cardenas, 2013) that are specific or do not cover the whole area of the Scientific Station: So this proposal is oriented mainly towards the malacological study (Antarctic molluscs) the purpose of generating and compiling baselines of biodiversity, scientific reference elements, for future studies of environmental impacts in the area, measurements of climate change, among other scientific-academic projects related to the Scientific Station Pedro Vicente Maldonado of Ecuador. This research proposal is part of the Molluscan Framework Project of Ecuador, which has been carried out for 15 years with the objective of characterizing in an integral way the terrestrial and fluvial malacofauna of Ecuador (Correoso, 2008, 2016) and is inserted in the objectives of biodiversity of DIGEIM-FUNDEMAR.



Sampling and measurement of “Lapas” in the Field.



Identification and measurement of Lapas in the laboratory

MATERIALS AND METHODS

The research was carried out in two phases

Field phase

Was executed in supralittoral and intertidal coastal zones free of ice, with exposure of rocky substrate in the scientific station Pedro Vicente Maldonado, in the localities: Cemetery of Whales, Dee Island, Sleeping Lion, Mount Puyango. Samples of molluscs were collected manually in the intertidal zone. Transect and plot methods were used to complement the monitoring considering habitat parameters, low tide period, differences of rocks levels in intertidal zone. The quadrants of 100 m and 1m subquarters equidistant species were applied at the biogeographic boundaries to determine species / Habitat variation

Laboratory phase

Measurements were made to molluscs in general, specifically to limpets *Nacella concinna*, with a calibrator MESS-SCHIEBR digital calibrator, precision.

The statistical softwares applied in the process for obtaining data: Minitab 18, to adjust the statistical test of Anderson Darling and its critical values (p-value and a-square); JMP® 13.2.1 (Statistical Discovery.™ From SAS), to correlate the variables by multivariate methods generating comparisons between Numeric and Ordinary categories.

RESULTS – STATISTICAL ANALYSIS - DISCUSSION

Malacological Biodiversity:

At the points sampled at the PVM Station during the XXI Expedition the preliminary diversity of collected molluscs is taxonomically composed of limpets *Nacella polaris concinna* (Strebel, 1908), as the most abundant and dominant species (N=115 samples) of intertidal molluscs, in the form of shells mostly dead; as indicated by previous authors (Cruz *et al*) (See Photographs). In second order, small clams (Bivalvia) were found abundantly in rocky areas with puddles of water and a single specimen of clam, of another type. Both species pending taxonomic determination. Other mollusc families included in this study, were less populous but important for the research were reported from, littoral rocky areas of the Station, were collected in previous monitoring expeditions by researchers of this article (M. Gualoto, 2012), corresponding to the Buccinidae, Littorinidae and Olividae. For a preliminary total in this expedition of six (6) families and eight (8) species (morphospecies).

Taxonomía Clase	Familia	Especie	Abundancia
Gastropoda	Nacellidae	<i>Nacella polaris concinna</i>	Abundante
Gastropoda	Buccinidae	Morphospecie 1	Rara
Gastropoda	Buccinidae	Morphospecie 2	Rara
Gastropoda	Littorinidae	<i>Littorina</i> sp.	Rara
Gastropoda	Olividae	Morphospecie	Rara
Bivalvia	taxonomía pendiente	Morphospecie 1	Común
Bivalvia	taxonomía pendiente	Morphospecie 2	Rara

Preliminary taxonomy table (Classes-Families) and relative abundance

Morphometry:

Molluscs were measured in batches, according to sampling locations, following specific protocols determined for each taxon according to literature and expertise.

Statistic:

According to the Anderson-Darling Normality Test, the data of the morphometric variables used in dependence of the taxonomic group (*N. concinna*) Are adjusted: Total length (mm), Maximum diameter (mm), Height of apex (mm). We considered all the parameters offered by the software, highlighting their "significance" the less normalized and atypical values such as: mean, standard deviation, A-squared and p-value (Anderson-Darling test). Analyzing it was observed, in the case of these measurements of the sample that the Total length has a standard deviation of 6,936 greater with respect to Maximum diameter 5,156; Height of apex 4,083. With a confidence level of 95%. The mean is correlated with the values of p and A-square, respectively.(See Figure 1, 2,3). It is worth noting that in the population of N. concinna the total length is quite variable in the range of 22,880 + - 53,920, according to the age distribution of the population. The distribution of larger size (L (G); L (XG)) is more concentrated 85.6% between the variables Total Length, Maximum Diameter, Height of apex in the Whale Cemetery, while Lapas of smaller size L (P) are located in the Sleeping Lion with 1.36%.

The packages of samples according to the localities of the sampling area so far behave comparatively as a single population or a good species, of the sampling area so far behave comparatively as a single population or a good species, without significant population discrepancies observable between the points sampled, although such sampling does not sufficiently cover all the ice-free areas of the sampled area. Station area and Dee Island.

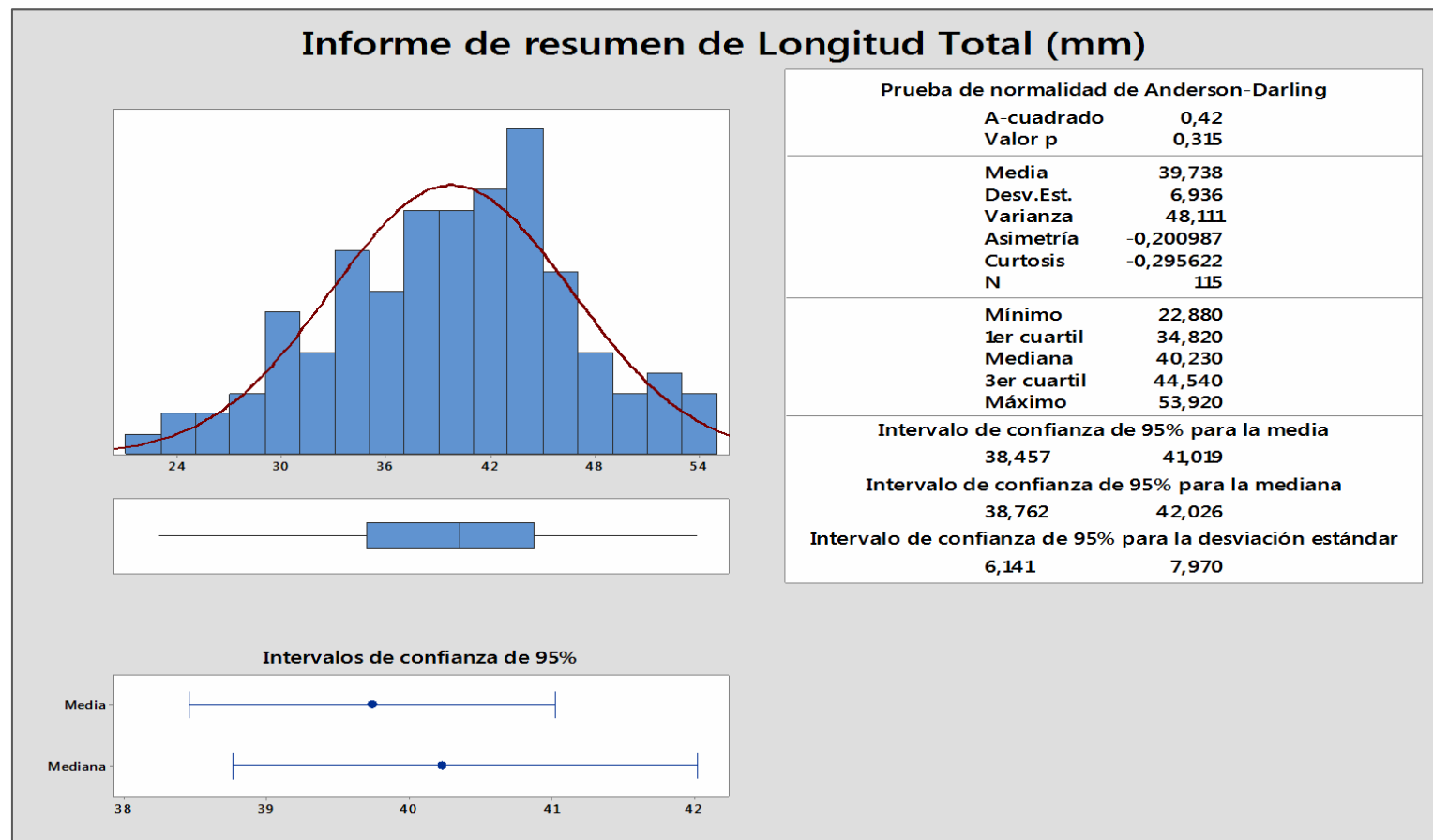


Figure 1. Source: Minitab 18

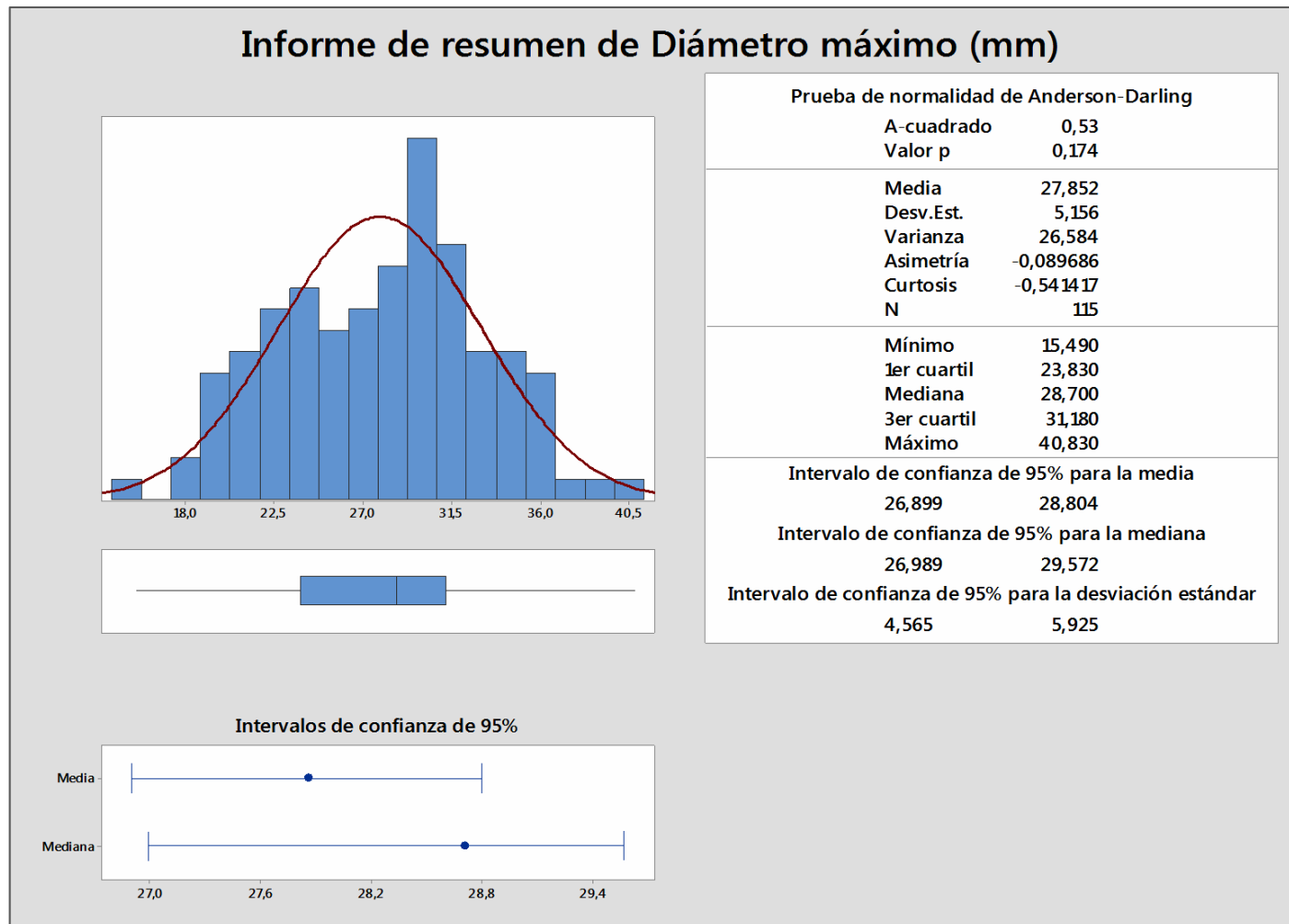


Figure 2. Source: Minitab 18

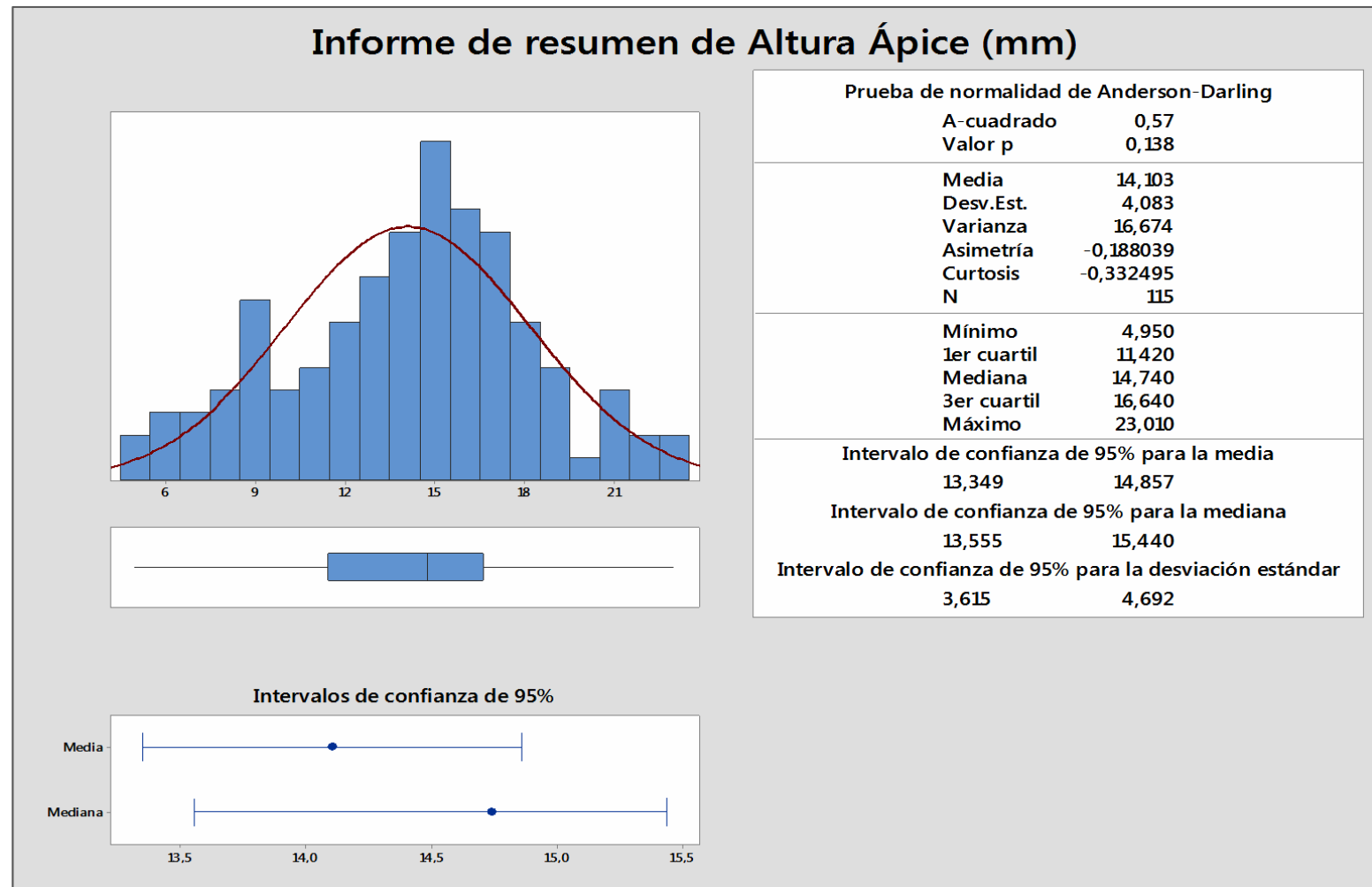


Figure 3. Source: Minitab 18

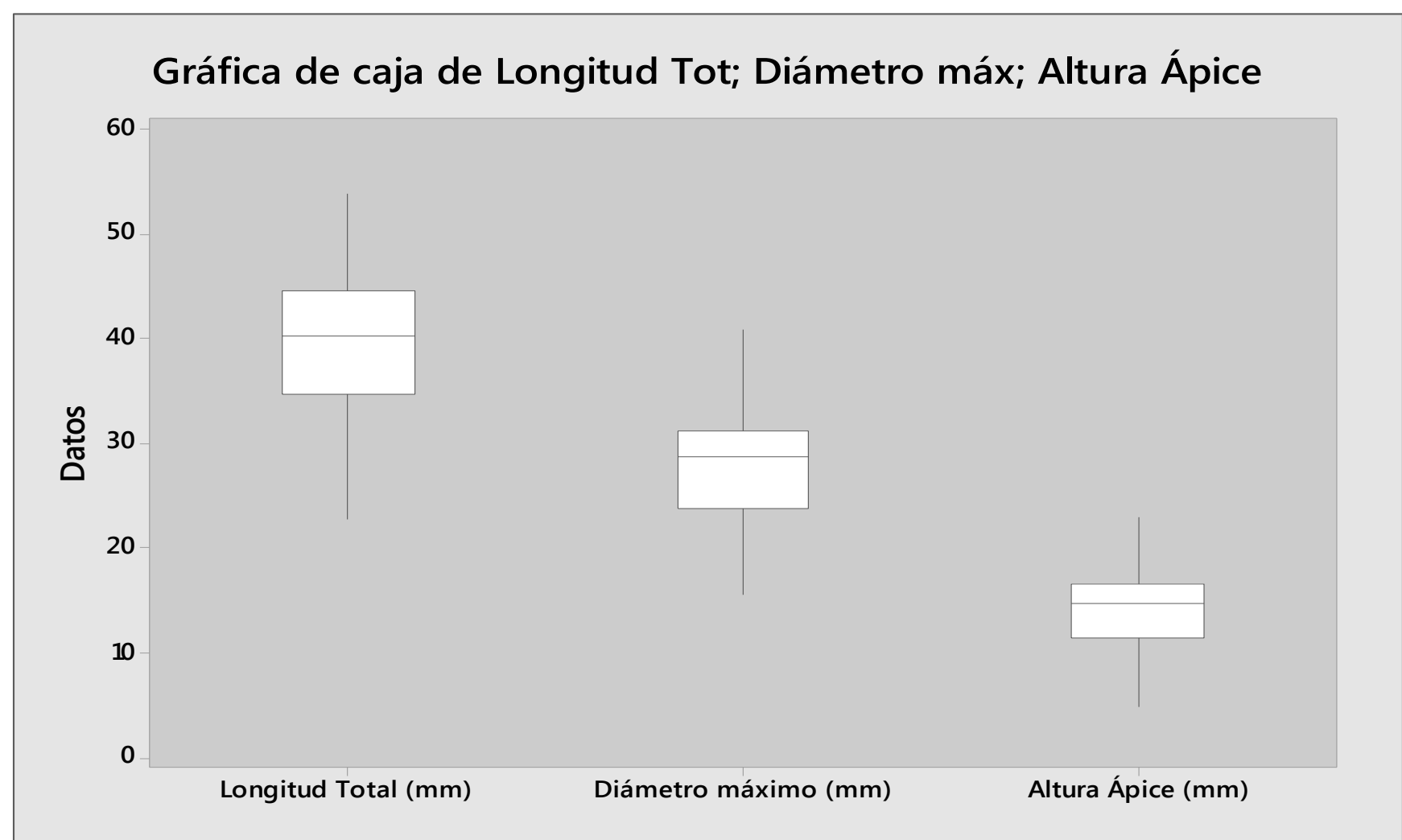
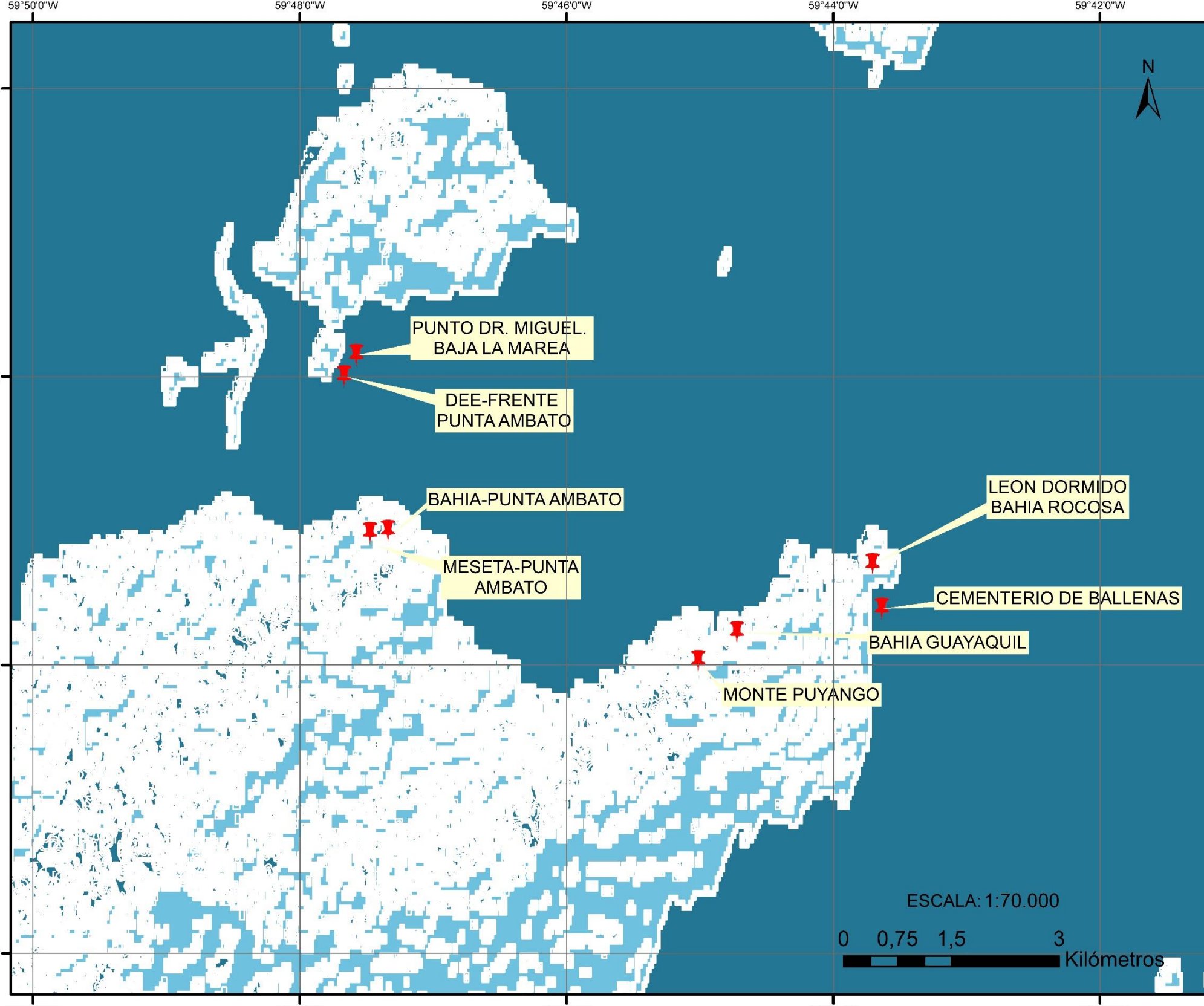


Figure 4. Source: Minitab 18



CONCLUSION

This study for its extension and logistics is still in Preliminary Phase I.

In terms of diversity, six (6) Families, four (4) of Gastropoda are described, including the well-known Lapas *Nacella* sp, two (2) of Bivalvia, which in total preliminarily group of eight (8) morphospecies in the litoral area (see photographs). Quantities still low empirically with respect to other similar areas of higher level and depth of sampling. The diversity of intertidal molluscs sampled at the station is still incomplete and requires a greater number of specific samples that take into account some variables: ecological, oceanographic, climatic, geographical, hydrological and meteorological (PEVIMA and Chilean). The majority of Limpets *N. concinna* of the studied population morphometrically presents normal correlations length, diameter, height. There were not anomalies in the three variables other than those expected by the "preliminary" age growth of the populations.

POTENTIAL APPLICATION

Due to the scientific and economic importance of coastal marine molluscs and large areas / regions of the coast at national and Antarctic level, they are not yet well characterized malacologically, although some studies of marine malacology have been carried out in other areas of the Antarctica (Cruz, 1990, Cardenas, 2013) that are specific and do not cover the whole area of the scientific station. This new study allows the strengthening of aspects aligned to GNPV and applications to future comprehensive research in relation to climate change, biodiversity and prospecting of nanometric polyethylene bioaccumulators in the oceans (Bioindicators), among other related aspects.

RECOMENDATIONS.

For all the above, it is suggested that the analysis of these morphometric parameters and absence of species can be correlated with geographic variables of the coastal zones of the station that allow to indicate the biogeographic distribution of these litoral molluscs with precision. As well as associated environmental variables.

Figure 5. Source: JMP® 13.2.1 (Statistical Discovery.™ From SAS)

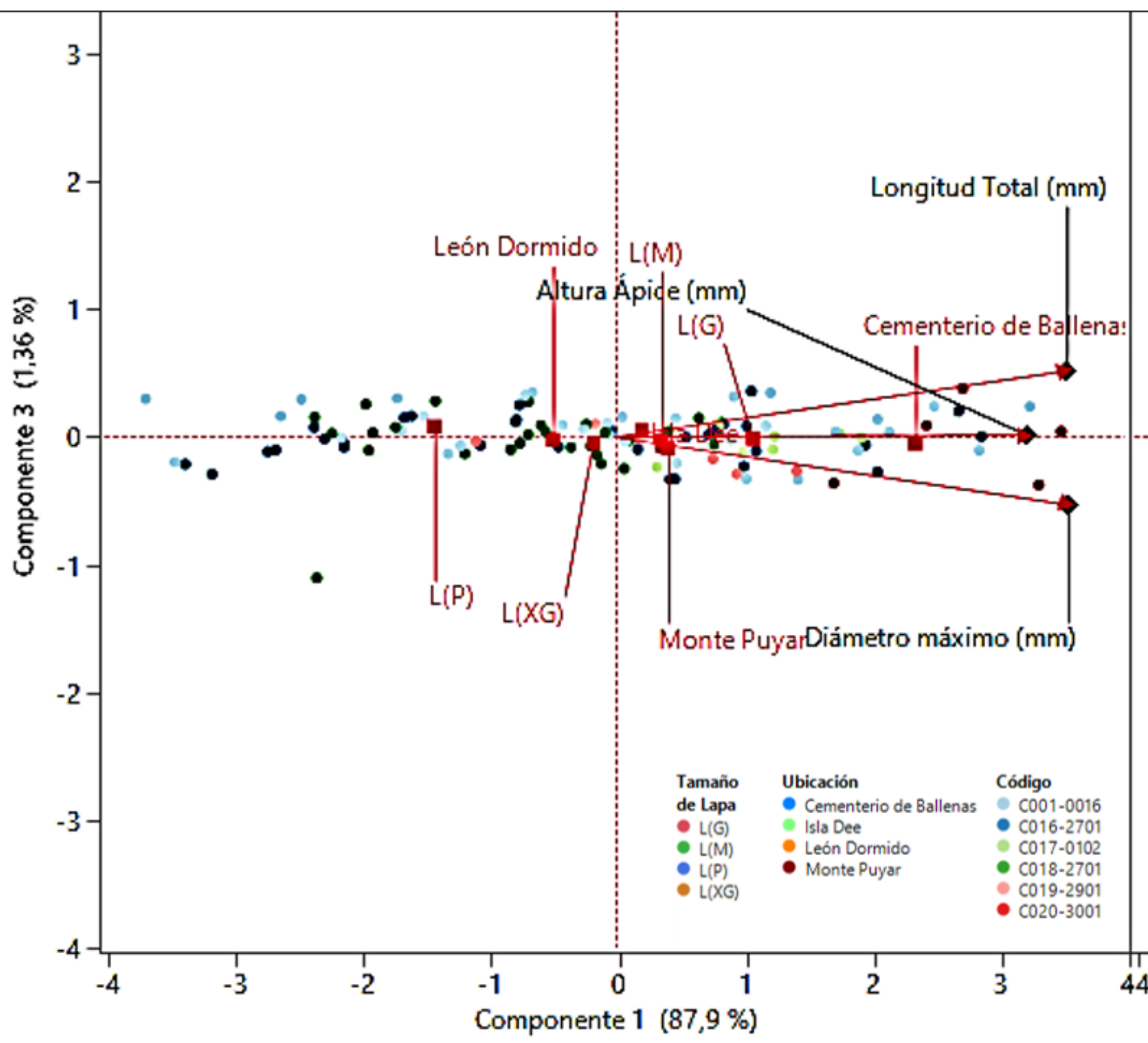
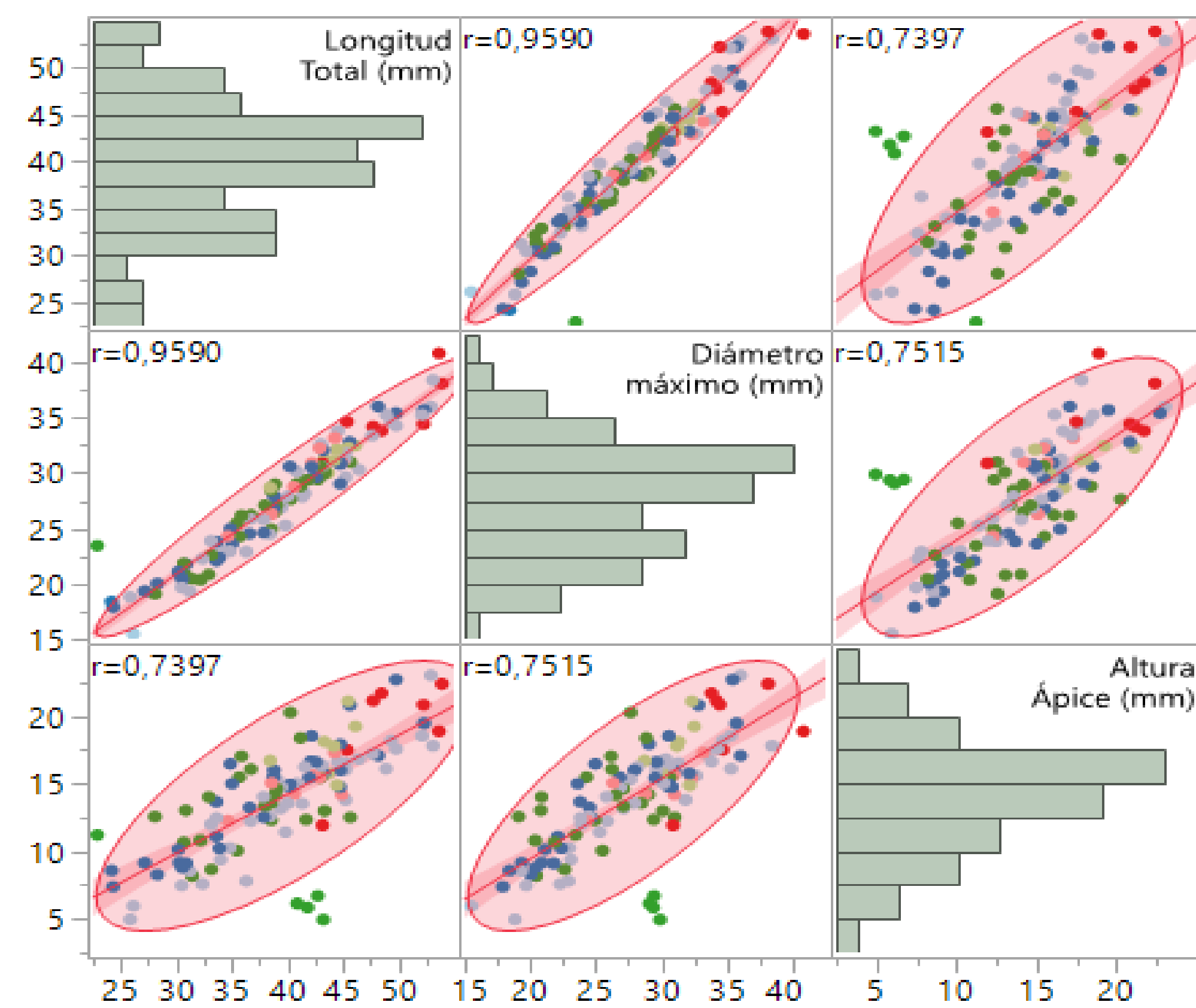


Figure 6. Source: JMP® 13.2.1 (Statistical Discovery.™ From SAS)

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