Research Article ISSN 2835-6276

American Journal of Medical and Clinical Research & Reviews

# PHENOTYPIC VARIABILITY AND VEGETATIVE PERFORMANCE OF SWEET POTATO CULTIVARS [*morning glory potatoes* (L.) Lam] IN TIMOR-LESTE: A CASE STUDY IN HERA, DILI (2024).

Celina Maria Godinho, Ana Cristina de Jesus Silveira Martins, Alice Pinto, Adilson Castro Ruas, Juvêncio Castro Ruas, Carlos Boavida Tilman.

*Correspondence: Celina Maria Godinho

*Received: 02 Feb 2024; Accepted: 05 Feb 2024; Published: 10 Feb 2024*

**Citation:** Celina Maria Godinho. PHENOTYPIC VARIABILITY AND VEGETATIVE PERFORMANCE OF SWEET POTATO CULTIVARS [morning glory potatoes (L.) Lam] IN TIMOR-LESTE: A CASE STUDY IN HERA, DILI (2024). AJMCRR 2024; 3(2): 1-13.

## *ABSTRACT*

***Introduction:*** *An exploratory study is written on the phenotypic characterization and vegetative performance of several sweet potato cultivars [Morning glory potatoes (L.) Lam] prospected in Timor-Leste. In three municipal markets of Dili, in 2016, 25 cultivars were collected that manifested differences in morphological characteristics observed; These 25 cultivars were propagated in nurseries for 1 month, and 9 did not survive. The remaining 16 were planted on a plot of land in Hera, Dili, in separate rows of 1.5 m, each row associated with a cultivar, with the propagules within the row separated by 1 m and relating to 8 replicates (clones) per cultivar, in a simple experimental design; the propagules consisted essentially of tubers, or, in its absence, sections of branches of about 20 cm.*

***Research Methodology:*** *Morphological characterization data were obtained by direct observation method, performed once a month for three months. For biometric measurement purposes, with only 12 cultivars surviving, the 20 largest branches (20x12 repetition = 240 branches) per cultivar were selected for three consecutive months, measuring branch lengths and others; Longitudinal surf was evaluated after one month in the nursery while lateral break was estimated after two months in the field.*

***Results:*** *A total of 20 forms or parameters were used in the morphoagronomic characterization of the cultivars, carried out and/or reconfirmed throughout the process in the 16 cultivars mentioned above. The biometric measurements, in a total of 10 types, refer to 12 cultivars, in which there were several sequential measurements in time, while the evaluation of the total production of tuberous units, in number and weight, only occurred at the end of the experiment. In the similarity matrix for the 16 cultivars evaluated, it can be seen that there are affinities and differences in a very marked amplitude.*

***Discussion:*** *It can be concluded, in general, that the tendency of production of tuberous units varies inversely with the growth of main branches, thus there is competition between the growth of the main branches. In addition, there is evidence of a positive or increasing linear relationship between the average weight of ‖ and the weight of the largest tubes in each variety, which can be considered rele-*

*vant (R2 41%) it can be expected that, in the general tendency, a total of 10 grams in the average-weight of the "tu terciles" will be translated into a total ofabout 18 grams in the weight of the largest.*

***Conclusion:*** *In the 16 cultivars coded on a case-by-case basis, it was possible to make an association with technical designations of varieties used in the germplasm conservation center in Triloc a and in the Research Center of the Ministry of Agriculture and Fisheries of Timor-Leste in Dari Sula of the Municipality of Baucau, and also in the scientific literature, the key point in realization of study cited by (Maria C.G & Tilman CB., 2024).*

**Keywords:** Morning glory potatoes (L.) Lam; exploratory study; cultivars; morphoagronomic description; vegetative performance; identification; conservation, resources.

## INTRODUCTION

Agricultural activity is an action of farmers and technicians that is intended to be associated with principles of sustainable food production, conservation of germplasm, improvement of plant genetic resources and maintenance of a balanced ecosystem ina social, ethical and political context. Thus, action for national development makes it imperative to reflect on the growing movement in which it is demanded that the negative impact – ecological, social and political – of technology on society and in the field of agriculture be ever less. adds that Goods FITO activity is part of the research-led solutions to meet this objective; Because new varieties have been developed, albeit informally, often called cultivar, capable of greater and better productions, in the great diversity of environments that man explores. The new cultures that are obtained are consequently also dependent on the processes of domestication over time, evolving from the wild state and on the adaptation of old cultures to new places and environments; Thus, it is possible to produce new mutants and polyploids from forms that are already, and were, cultivated. Productivity, or success, will be conditioned by the potential of ecological and bioeconomic factors and the associated nutritional interest.

The sweet potato [*morning glory potato*, (L.) Lam] is a very important species in the world diet – and also in Timor-Leste – and is in the process of being domesticated in several parts of the territory, and should be included in the source of new crops, for example. Its properties of high nutritional quality which, however, require adequate cultivation methods, involving Phyto technical aspects, phytopharmaceuticals, fertilizers, irrigation and other additional operations, intensive practices that, however, are more energy-consuming and that can induce less variability of phenotypic constitutions due to the selection of the most productive varieties. The *International Potato Center* (CIP) is a scientific and technical institution, founded in 1971, autonomous and dedicated to the development and dissemination of knowledge about sweet potatoes, roots and tubers Andean countries are improving their use as staple foods in developing countries.Also, the main function defined by the IBPGR (*International Board for Plant Genetic Resources*) advisory group is to support an international network of genetic resource centers to promote and coordinate the promotion of the collection, conservation, documentation, evaluation and use of plant germplasm, contributing to an improvement in the standard of living and well-being of the world population and also in the conservation of genetic resources. In 2016, the National

Parliament of the RDTL ratified its adherence to the International Convention on Biological Diversity (IADB), which was part of the author's motivation in this study. Article 1 of the IADB mentions interrelated issues on the conservation of biological diversity, the sustainable use of its components and the fair and equitable sharing of benefits arising from the use of resources including through adequate access to those resources and the appropriate transfer of relevant technologies.

Article **12 of** the IADB refers to research and training, with the principle of promoting and encouraging researchers to contribute to the conservation and sustainable use of genetic diversity, taking into account the recommendations of the subsidiary advisory body for scientific, technical and environmental issues. as well as to promote and cooperate for the access and transfer of biotechnology, establishing scientific and technical cooperation aimed at maximum support for agriculture. Thus, it is intended that there are several programs of genetic improvement of plants that can contribute to an adequate development of high yielding cultivars adapted to different edaphoclimatic conditions in the country, with conservation precautions (e.g. Pinheiro and Garcia, 2010). In Timor-Leste, the sweet potato [*morning glory potato*, (L.) Lam] is considered one of the main crops of the family diet, which has a high nutritional value and economic power, being considered as a horticultural crop. Sweet potato is a plant that is easy to grow and has wide adaptation, high tolerance to dryness and low production cost, develops in different soil types and is easily adapted to different topographies and climatic conditions in Timor-Leste (Sol-MAP, 2013; cited by (Maria C. G & Tilman CB., 2024). In Timor-Leste, sweet potatoes are referred to as one of the main foods, after rice and maize (Soares *et al*., 2014; NSDP-TL, 2011-2030). According to recent data from the 2019 agricultural census (TLAC, 2020), considering the gross agricultural area of 509226 there are, among the 13 largest agroforestry crops led by corn (18%), followed by rice (7.6%) and cassava (7.4%) – sweet potatoes occupy 2.8% as expressed in Figure 1.

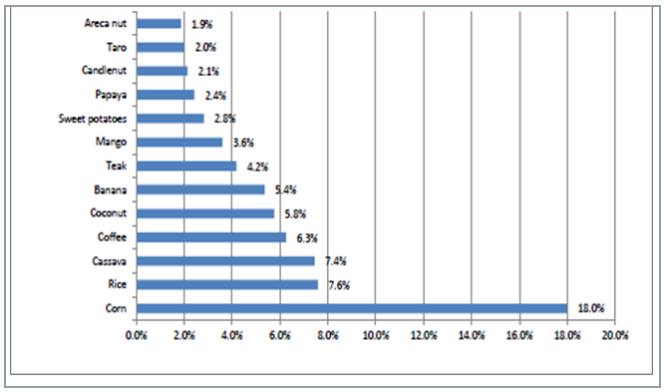



Figure 1 – Main agroforestry crops referenced in Timor-Leste, based on the census of 20 20 (TLAC, 2020), by percentage of gross area.

## Objectives:

The specific objectives are:

- Identify some centers of domestication of cultivars in Timor-Leste, a characterization sheet for the sellers: identification of the person; place of domestication; cultivation of a n d a s for various reasons, and recent e m ente importadtos.
- To know and evaluate the phenotypic similarity through morphoagronomic characterization of about two dozen descriptors applied to 16 cultivars.
- Quantify more than a dozen biometric characteristics related to physiological behaviors and yield(s), for 12 cultivars, and
- Warn of risks associated with the safeguarding of genetic resources related to the cultivation of the species;

## THEORETICAL FRAMEWORK

Sweet potatoes originated on the American continent (Lebot, 2009, p.89); the author adds that the primary center of origin is located in the northwest of South America and in the region of the Mayan civilization of Central America; from records made by Christopher Columbus in Hispaniola (now Haiti) and by several Spanish explorers and missionaries in Mexico and Peru, and also by the Portuguese in Brazil, it has become evident that sweet potatoes were cultivated on a large scale throughout Central and South America before the first European contact (Oliveira *et al.,* 2002), which is also mentioned by other authors; In relation to the modern age, the sweet potato originating in the Andes in Peru was taken to Europe in the sixteenth century by the Spaniards (César *et al*., 2010, p.39), usually referred to as an American plant, cultivated by the indigenous people of Mexico, Peru and Brazil in the reference for the continuation of the study under development (Prata, 1983, p.137; cited by Maria C.G & Tilman CB., 2024), also referring to the fact that sweet potato plants were widely used in the past to feed slave workers and the working population, for example in the Maranguape mountain range in Brazil.

Since 2013-14, an intervention of the MAP-RDTL programme has been taking place and progress continues to be made towards achieving the national goals of food self-sufficiency, aiming to increase productivity, diversify the range of products and move the country from traditional subsistence agriculture to a more efficient and modernized agriculture, eventually with the capacity to increase exports. An indication of the importance of the crop can be summarized as follows: sweet potatoes occupy one of the first places in the statistics of the world crop, right after cassava. The sweet potato crop has favorable characteristics, such as: good edaphoclimatic adaptability; Rusticity; high productive potential, achieving an increase in production easily, as its cultivation is carried out in a rudimentary way, with little investment and low use of technology, but the lack of information on technical issues can hinder the conservation and management of the crop (Galeriana *et al*., 2020). The area of origin is evidenced by the great diversity and number of native potato varieties and wild species of the morning glory genus, revealed by the use of molecular markers – for example, 329 cultivars from Mexico to Peru are mentioned (Roullier *et al*., 2013, a, b) with chloroplast and microsatellite markers and analysis related to their morphological variation.

The *species Ifarmeia batatas/potatoes* (L.) Lam., belongs to the family Convolvulaceae and the genuinely (Lebot, 2009; Van Seteeis *et al.* 2013). The taxonomic classification is as follows:

Kingdom: *Plant*, Division: *Magnoliophyte*, Class: *Magnoliopsida*, Order: *Solana*, Family: *Convolvulaceae*, Genus: *Morning Glory*, Species : *Morning glory potatoes* ( L.) Lam. Regarding sweet potato, Lebot (2009) states that the base number of chromosomes is n=15, with diploids (2n=30), triploids (3n=45), tetraploids (4n=60) and haploids with 6n=90 chromosomes; These multiplication events can occur when, in the process of cell division, chromosomes are duplicated, but cytokinesis does not occur by which the cell would divide into two new cells, causing it to double the number of chromosomes. It is still considered to be tetraploid evolving to haploid (Borges *et al.*, 2006). According to Silva *et al*., (2015), this vegetable, which belongs to the *Convolvulaceae* family, is the only haploid member (2n = 6x = 90) and the very high

variability within the species may probably be derived from the high level of polyploidy.

In the study by Nascimento *et al.*, (2013; cited by Maria C. G & Tilman CB., 2024) states that the analysis of the centesimal composition of the content of bio-fortified sweet potato starch results in the following values associated with intervals: moisture (g) 7.05±0.16; ash (g) 2.88±0.22; proteins (g) 5.48±0.41; lipids (g) 0.60±0.12; carbohydrates (g) 65.18±1.47; fibers 18.81±2.38; total energy value (kcal) 287.88 (1222.74 KJ/) and total carotenoids (µg) $18x10^{3}$. It should also be noted that it is a product considered rich in mineral salts such as calcium, iron and also vitamin A (Molina *et al.,* 2014; Sousa *et al.*, 2020) for human food, and also for feed a ni m a l, m a carron (Lebot, 2009) and the-tubers‖canbe eaten roasted, boiled or fried without the addition of any condiment (Murilo, 1990). Some cultivars are rich in carotenoids and carotenes are convertible by the human body into vitamin A, which is an antioxidant with anticancer properties (Guedes, 2004) Thus, sweet potatoes are considered as one of the bio-fortified vegetables, which as viable and alternative food sources; for the treatment of micronutrient deficiencies such as iron, zinc and vitamin A that can help reverse nutrient deficiencies, thus reducing the number of cases of child malnutrition and reducing the prevalence of hidden hunger.

Climatic variables have an influence on the different phases of agricultural production, both in the harvesting, storage, transportation and marketing of sweet potatoes (Alves *et al.,* 2012). The climate is one of the main factors for the satisfactory development of the crop, although it presents some plasticity in relation to different climatic conditions and high tolerance to drought (Gonçalves, 2011), having adaptability to different edaphoclimatic conditions (Cavalcante *et al.*, 2009). Generally, this crop is considered a complex that contributes to the stability and richness of the ecosystem(s) with great photosynthetic efficiency, implying the production of biochemical substances in the natural ecosystem, which add biological diversity, while contributing to groundwater quality and control of soil susceptibility to erosion (Pereira *et al.,* 2012). It is a well-adapted crop, especially in regions with a tropical and subtropical climate, with great luminosity and well-distributed rainfall (Molina *et al*., 2014); Its dispersion along tropical latitudes, but also in temperate latitudes, with habitation in the driest and most open places, and can be cultivated at altitudes as high as 2500 meters by communities living in the mountains, occurring in more than 100 countries, mainly in developing countries (Lebot, 2009). Sweet potato crops prefer light soils, from sandy loam to sandy loam and salicology soils with good drainage, and very compact soils should be avoided, particularly heavy clay soils; In addition, there is an indication that the crop reacts better to organic fertilizers than to mineral fertilization, and less steep soils are preferable to avoid erosion and facilitate management. The roots can penetrate the soil to a depth ± 2 m if the soil is deep enough, which allows it to survive in a dry condition by having a root system that absorbs water in deeper soil layers. The expression of visible symptoms of nutrient deficiencies shows up in the form of overt chloroses due to the reduction of chlorophyll pigment in the leaves of a lighter on implementation (Lebot, 2009; cited by Maria C.G. & Tilman C.B., 2024).

## METHODOLOGY

The experimental area, the dates of germplasm collection, the identification of provenances are de-

scribed, followed by the design scheme used, highlighting the following aspects: *polybag* planting and replanting in the field; as well as the subsequent procedures for evaluation of morphoagronomic and biometric characteristics as well as the techniques associated with the subsequent discussion results. It has an exploratory nature, that is, there is no systematic inventory of cultivars of this species in Timor-Leste, therefore, this work aims to contribute to a first approximation to the development of this possible research project. Thus, it is proposed to characterize, within the sample considered, a typology of phenotypic variability (e.g., Rampazona, 2002; Moreira, 2004; cited by Maria C. G & Tilman CB., 2024), from different sweet potato cultivars. The variables will be morphological aspects, observable and eventually measurable properties and characteristics. Subsequent experimentation is considered to have identified 25 cultivars, of which only 16 survived and only 12 developed sufficiently to be able to perform biometric measurements. Using qualitative and quantitative methods and evaluating their vegetative performance.

From a total of 6 larger markets in the city of Dili – namely Becora, Bidau Santana, Comoro, Manleuana, Taibessi and Tasi-Tolu – 3 were randomly selected, resulting in Comoro, Manleuana and Bidau Santana. We consider the markets as privileged units for the concentration and exhibition of collections of live plants – in the case of sweet potatoes, where we collected germplasm samples (tubers and vegetative branches). In the aforementioned markets, the plaintiff and her helpers bought germplasm (tubers‖ and sweet potato branches) of the different varieties that the vendors brought for sale for 5 consecutive days. The experimental area is located on a plain, in the Aldar Village, Suco Hera, Cristo Rei Administrative Post the Municipality of Dili, which is the capital and economic center of the country. The area was selected because it is an old vegetable garden and is located near a water line, with an elevation above sea level (altitude) of about 20 meters; and approximately with latitude 08°32´18"S and longitude 125°41´04"E. The characterization and evaluation of morpho agronomic descriptors as well as the biometric measurement were started on 27 February before replanting in the field and repeated on 27 March and 15 April. Finally, on July 15, the *final harvest* was carried out, which resulted in the reported counts and weighings. The methods of collecting and analyzing information on the performance of different cultivars involve qualitative analysis techniques (observation and characterization of morpho agronomic variables) and quantitative analysis (measurements of biometric variables) in experimental study of sweet potatoes in different varieties in the national and global context cited by (Maria C. G & Tilman CB., 2024).

## RESULTS AND DISCUSSION

Regarding the description and preliminary evaluation of the input data, we were able to collect information and document the characteristics of vegetative propagules that present different phenotypes, with an initial total of 25 types of cultivars: 18 differentiated by tuber types and 7 identified by different types of vegetative branches. Of this total, however, the researcher was only able to evaluate 16 cultivars with distinct morpho agronomic characteristics, with 15 different types of tubers and 1 type of specific vegetative branches, which, in any case, have successfully propagated to obtain tubers. It is recalled that the codes formed by 3 letters, i.e. XYZ, refer to: X – color of the epidermis of the tubercle; Y – tuber pulp color; Z – place of origin;

however, the codes beginning with R are different because the letters RV mean ―r a m veg e t ativ as‖, poor exe m plo, RVP te m-s and–ram as vegetativas de Ponilala Ermera. It should be noted that the m e n t i on a –cultivar au t o c ton e/d o m e sticaof e/ou exogenous cultivar in the last column of Table 1, refers to what will be the sellers , being considered ―auttoctone‖ when they stated that it has been cultivated in the family for some generations, While it means that the sale of the market is in the last place of the d ife rente , usually another municipality, and more often in the capital, Dili. Table 1 – Reported provenances of vegetative propagules collected by information obtained from 9 vendors in 3 markets in Dili, January 2016. The code FG, AB etc.: means the code of the person's name; also, V – seller; P – producer; V/P – Seller and Producer.

Cultivar codes: see bottom of table.

| Cultivars/Code | Provenance | V/P | Mention on Cultivars |
|---|---|---|---|
| **UBI** | Guiacana- Baucau | FG, v/p | Autochthonous/Domesticated |
| **VLB** | Berc oli- Baucau | AB, v/p | Exogenous/Imported |
| **LLW** | Waidarehó-As Baucau | MI, v/p | Exogenous/Imported |
| **BCU** | Uaicana- Baucau | FG, v/p | Autochthonous/Domesticated |
| **VBB** | Market - Baucau Venilale | EA, v | Autochthonous/Domesticated |
| **CLF** | Fatumaca- Baucau | JC, v/p | Autochthonous/Domesticated |
| **RRT** | Triloka – Baucau | DS, v | Exogenous/Imported |
| **RRB** | Berc oli- Baucau | AB, v/p | Exogenous/Imported |
| **RRW** | Waidarehó-As Baucau | MI, v/p | Exogenous/Imported |
| **RRS** | Market. Suai | EA, v | No information. |
| **CBS** | Market. Suai | EA, v | No information. |
| **BBS** | Market. Suai | EA, v | No information. |
| **ARL** | Loilubu – Baucau | MT, v/p | Exogenous/Imported |
| **AAL** | Loilubu – Baucau | MT, v/p | Exogenous/Imported |
| **ALL** | Loilubu – Baucau | MT, v/p | Exogenous/Imported |
| **rBH** | Hera Dili | DS, v | Exogenous/Imported |
| **Rll**** | Loilubu – Baucau | MT, v/p | Autochthonous/Domesticated |
| **RRL**** | Loilubu – Baucau | MT, v/p | Autochthonous/Domesticated |
| **RVRb1*** | Railaco – Ermera | AG, V | No information |
| **RVRb2*** | Railaco – Ermera | AG, V | No information |
| **RVPc1*** | Ponilala-Ermera | FE, v/p | Autochthonous/Domesticated |
| **RVPc2*** | Ponilala-Ermera | FE, v/p | Exogenous/Imported |
| **RVPc3*** | Ponilala-Ermera | FE, v/p | Exogenous/Imported |
| **RVPc4*** | Ponilala-Ermera | FE, v/p | Autochthonous/Domesticated |
| **GLA**** | Loilubu – Baucau | MT, v/p | Exogenous/Imported |

**Legend:** Color phenotype codes of the pulp epidermis: Rose-White Uicana (UBI); Red-Orange Bercoli (VLB); Orange-Orange Waidarehó (LLW); white-colored uicana (BCU), red-white baucau (VBB); Cream-Orange Phatma (CLF); Purple- Triloca Purple (RRT); Waidarehó Purple-Purple (RRW); Purple-Purple Bercoli (RRB); Purple- Suai Purple (RRS); Cream-White Suai (CBS); White-White Suai (BBS); Yellow-Purplish Loilubu (ARL); Yellow-Yellow Loilubu (AAL); Yellow-Orange Loilubu (ALL); Rosa-da-Branca Hera (rBH); pinkish-pale orange Loilubu (rLL**); Purple-Purple Loilubu (RRL); and 2 types

of vegetative branches (2RVR*); 4 types of vegetative branches (4RVP*). ** It means that the specimens were destroyed by rodents; * means that vegetative propagation was not successful.

Thus, we have, in 4 regions: a) in the Western region, 4 cultivars from the Suai market; b) in the Central region, 2 cultivars from the Railaco Market and 4 from the Administrative Post of Railaco the Municipality of Ermera; c) in the North region we have 1 cultivar of Hera-Dili; d) finally, in the Eastern region, we have 1 cultivar from the Baucau market, also from the Venilale market, and 2 cultivars from the Triloca juice, also located in the Baucau region, 1 of which is identical to a provenance from the Bercoli juice; 1 from Buburaga-Fatumaca, 6 from Loilubu and 1 being equal to a provenance of RRS number of Suai Market, 2 from Bercoli, 3 provenance from Waidarehó and these cultivars are identical to Asa-Laetula, 3 provenance from Uaicana and 1 identical to a provenance from Waidarehó. Therefore, in total, 25 cultivars considered different are reported, in the implementation practice cited by (Maria C.G & Tilman CB., 2024).

From the results presented in this subsection, it can be seen that although the sampling only focused on 3 markets in Dili (Comoro, Manleu and Bidau) for one week (morning and afternoon visit), it was still possible to identify 25 different cultivars, although only 16 continued for the study – because, according to As has already been said, the rest have irreversibly deteriorated – which seems to indicate that there is, in Timor-Leste, a considerable diversity of sweet potato phenotypes that should deserve a resource conservation strategy. One of the most important considerations to keep in mind refers to the domestication and conservation of most of the cultivars in this study that are shown to be centered in Baucau, with a total of 15 (of which 3 died) varieties out of 25 (of which 9 died, including 3 from Baucau and 6 from Ermera); therefore, of the 16 varieties evaluated in terms of morphoagronomic characteristics 12 are from the municipality of Baucau and the rest are 3 from Suai and 1 from Hera (Dili).

Morphoagronomic characterization is important, allowing to provide some identity to the genetic material through the knowledge of a series of parameters that allow the study of the genetic variability of the sample (e.g., Martins, 1991; Andrade *et al,* 2009). On the other hand, heritable botanical descriptors are adopted, easily visible and measurable, which will be expressed according to the environment (Huamán, 1991). It is a simpler and less expensive type of analysis, although there are limitations related to the characters that are present in sweet potatoes in the test field. The identification of characters that show high correlation is very important (Nunes, 2016: cited by Maria C. G & Tilman CB., 2024). Thus, we were able to evaluate a measure of phenotypic percentage correlation that can be observed in table 2 - Matrix (%) of the Similarity on morphoagronomic characteristics from 16 varieties of sweet potato cultivated in Hera of the Municipality of Dili. (2024).

Table 2 Matrix of percentages the similarity process cultivated.

| Var | UBI | VLB | LLW | BCU | VBB | CLF | RRT | RRB | RRW | RRS | CBS | BBS | ARL | AAL | ALL | rBH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| UBI | * | 16 | 17 | 11 | 32 | 21 | 5 | 11 | 16 | 11 | 32 | 46 | 17 | 22 | 16 | 16 |
| VLB | | * | 0 | 16 | 30 | 30 | 25 | 5 | 25 | 15 | 25 | 16 | 10 | 21 | 32 | 25 |
| LLW | | | * | 6 | 16 | 16 | 16 | 21 | 5 | 5 | 16 | 23 | 32 | 22 | 11 | 21 |
| BCU | | | | * | 16 | 27 | 11 | 11 | 22 | 5 | 22 | 29 | 33 | 23 | 29 | 5 |
| VBB | | | | | * | 15 | 21 | 20 | 10 | 10 | 15 | 16 | 21 | 0 | 0 | 5 |

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CLF** | | | | | | * | 17 | 10 | 15 | 25 | 60 | 22 | 21 | 21 | 21 | 25 |
| **RRT** | | | | | | | * | 67 | 77 | 51 | 21 | 11 | 21 | 27 | 22 | 15 |
| **RRB** | | | | | | | | * | 50 | 35 | 20 | 16 | 15 | 21 | 16 | 20 |
| **RRW** | | | | | | | | | * | 45 | 25 | 11 | 15 | 26 | 32 | 20 |
| **RRS** | | | | | | | | | | * | 15 | 11d | 5 | 32 | 32 | 40 |
| **CBS** | | | | | | | | | | | * | 22 | 31 | 32 | 26 | 35 |
| **BBS** | | | | | | | | | | | | * | 11 | 34 | 34 | 27 |
| **ARL** | | | | | | | | | | | | | * | 27 | 22 | 5 |
| **AAL** | | | | | | | | | | | | | | * | 83 | 32 |
| **ALL** | | | | | | | | | | | | | | | * | 37 |
| **rBH** | | | | | | | | | | | | | | | | * |

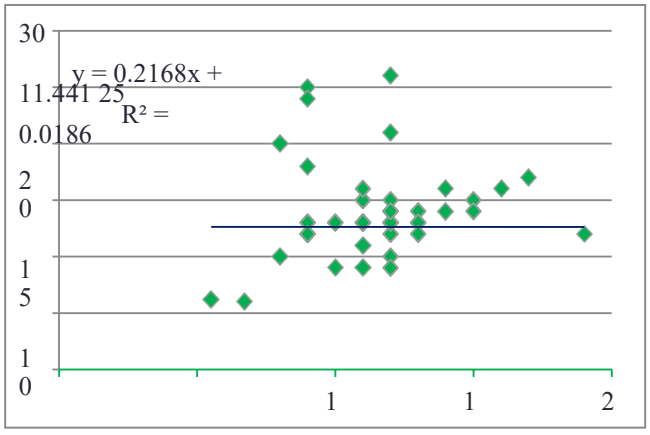
Table 2s h o w s the pairs of cultivars with the least similarity (between 0 and 5%), of which the following pairs are shown with zero (complete age dissimilarity): VLB and LLW; VBB with AAL and ALL; Yellow shows the very dissimilar pairs (6% to 20%); white shows the intermediate situation with 21%-39% values. On the other hand, the cultivars with the greatest similarity are, in green: 40%-50%, UBI with BBS, RRW with RRS and RRS with rBH; at the 50% border, we have RRT with RRW; with more than 50%, in blue we have the pairs CLS and CBS, RRT with any of the three RRB, RRW and RRS; the highest value, exceeding 80% is the pair AAL and ALL. Based on the characterization result of the 16 cultivars of the species under study (*morning glory potatoes*), each variety naturally has its own characteristics. In the analysis, the categories of the Sourense Similarity Index were applied with the quantification of scales proposed by Kendeigh (1944): when the percentage (%) of similarity is less than 50%, it is considered that the objects are not similar, while, on the contrary, when the similarity values are greater than 50%, it is considered to have (some) similarity, which is greater as the percentage value obtained; At most, 100% means identical objects within the limits of perception of the characteristics considered. Based on table 3 and the calculated values of the Sourense Similarity Index, it can be said that from a perspective of conservation of genetic resources – although aware of the limitations of this assessment only in the phenotypic characterization of 16 cultivars – it will be important to give priority to the conservation of varieties that present lower levels of the same species. similarity (or greater dissimilarity) with the others, therefore those that are more specific or less redundant. Table 3 – Identification of the least redundant varieties in the set.

| | |
|---|---|
| VLB | 32 (30) |
| LLW | **32 (23)** |
| BCU | **33 (29)** |
| VBB | **32 (30)** |
| ARL | **33 (32)** |

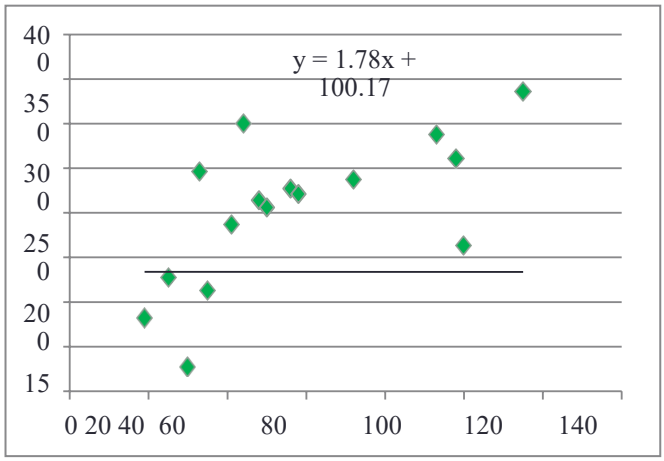
As the various molecular studies of *morning glory* potatoes have been intensified, the hypothesis that sweet potatoes constitute an evolutionarily recent group of organisms, including morphological evolution within *populations*, has become stronger. Regarding the relevance of the similarity/ dissimilarity of the age of the morpho agronomic traits that were qualitatively evaluated, differences were observed between populations in a range of 0 -83%, as expressed in t ABELA 2. Regarding the AAL/ALL pair, the only one that shows a percentage higher than 80%, it is worth remembering the set of characteristics that deserved attention and are similar: i) the color of the branches is predominantly green with few purplish spots and a moderate superficial low, being lowers the apical pu-

bescence of the branches; ii) the pigmentation of petioles is purplish with green at the insertion of the leaf in the node and the leaf has seven lobes, the central lobe being lanceolate oblong in shape; si) did not show flowering, in any case. The existence (or not) of some linear relationship between the average length of the limb and its average width was also investigated (in a total of 48 observations, relating to 4 pots per variety in the set of 12 varieties; In each pot, the average width and length of 5 larger leaves of the respective variety was calculated) And, in fact, using simple linear regression where the predictor variable a (x) is the maximum (mean) length of the limb and the response variable (y ) is the maximum (average) width of the limbus, the relationship illustrated in the graph below was obtained, which shows that *there is no* relevant association (only about 2% of the variability of y is explained by the line).

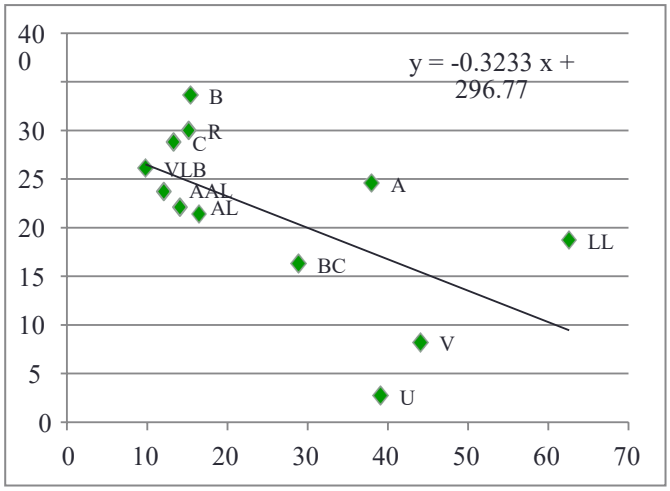
Graph 1 – Linear regression between maximum length (mean) and maximum width (average) expressed in five meters (cm).




Graph 2 – Simple linear regression between average weight of tubers in every variety (□) Understood how variable Independent and maximum weight Medium (□), understood as variable dependent or response variable.




The model set, of the shape y = a + bx shows a linear relationship with some relevance, because the variability of the response variable (□ – maximum weight tuber means) is explained by the straight line in just over 40% (coefficient of determination □2 □ 0.407). Getting one little less from 60% by explain associate an error or other variables now Introduced in model; a coefficient from correlation in case valley r = √0.4067 □ 0.638. In synthesis ago one relation linear positive or crescent (straight with slope positive) between a variable □ Representing a weight medium from Tubers in every variety and maximum-average weight (□) of the same variety. It was found that be one relation linear positive or crescent (straight with formalize position) between a variable □ Representing o weight medium from —tubercule. The process in each variety and the maximum-average weight (□) of the same variety that is can consider relevant (□2 □ 41%). Graph 3 – Outline of relation descending between weight maximum-medium from —Tuberthe (□ - Grams) and compromise from ram the longitude (□ - cm) in different cultivars, but it is a good result of implementations cited by (Maria C. G & Tilman CB., 2024).




## CONCLUSION

Of the total of 25 cultivars acquired, it was only possible to obtain information on the provenances of 14 types of clones: of these, 7 are reported as domesticated for several generations in the respective family or village, and another 7 were obtained by sellers from the 2010s, being considered improved cultivars obtained from non-governmental organizations (NGO's) or m es m of governments, under all environment of the program –Fini be Moris‖/Seeds of *Life*. Altogether, the propagules used come from 4 regions of Timor-Leste with their provenance location in 11 distinct domestication sites, as described in chapter 4 and as has been repeatedly mentioned, of the 25 cultivars acquired, only 16 cultivars were evaluated in relation to morpho agronomic traits and 12 in terms of biometric measurements. The least redundant cultivars, among the 16 observed, are those coded as VLB, LLW, BCU, VBB, and ARL, which may deserve more care in a resource conservation strategy genetic. However, the relevance of this conservation strategy will imply the observation of existing varieties in all conservation centers in Timor-Leste procedure cited by (Maria C. G & Tilman CB., 2024).

On the other hand, the cultivars with greater similarity, in this case with more than 50%, are found in the pairs CLS and CBS, RRT with any of the three RRB and RRW and RRS; the highest value of similarity exceeding 80% is the pair AAL and ALL, in which the most distinctive characteristic was the color of the pulp of the tubercules. The full composition of sweet potato genetic diversity in Timor-Leste is still largely unknown, has not been identified and may never be fully understood, given its magnitude and complexity. In addition to environmental factors, the induction of new improved cultivars from other countries that are highly productive and uniform can lead to genetic erosion of autochthonous sweet potato cultivars, an issue that should deserve attention in the implementation practice cited by (Maria C. G & Tilman CB., 2024).

## REFERENCES:


1. Albuquerque, D. (2012). Morphosyntactic sketch of the Portuguese spoken in Timor-Leste. ModenaSpray,106 (1),1-10.
2. Alves, R. Q. (2014). Morphological and agronomic diversity and potential for ethanol production from sweet potato germplasm. [Master's thesis in Agroecosystems, area of concentration in Production in Agroecosystems]. Universidade Federal de Sergipe, Brazil.
3. Andrade Júnior, V.C., Donato, L.M.S., Azevedo, A.M., Guimarães, A.G., Brito, O.G., Oliveira, D.M. Medina, A.J. & Silva, L.R. (2020). Association between agronomic characters and hay quality of sweet potato branches. Horticultura Brasileira, 38(1), 27-32.
4. Casquilho, J.P., (2014). Memories of sandalwood: Malacca, the Timor attractor and the Solor canal. Veritas Magazine, 4, 99-120.
5. Cavalcante, M., Ferreira, P.V., Paixão, S.L., Costa, J.G., Pereira, R.G., & Madalena, J.A.S.

(2009). Productive and genetic potential of sweet potato clones. Acta Scientia rum Agronomy, 31(3), 421-426.

6. Costa, A.J. (2010). Kajian metode kesesuaian lahan untuk beberapa tanaman pangan di Sub Distrito Cristo Rei Distrito Dili [Master thesis].
7. Costa, M. J., Lopes, M., Ximenes, A., Ferreira, A.R., Spyckerelle, L., Williams, R., Nesbitt, H. & Erskine, W. (2013). Household food insecurity in Timor-Leste. Food Security, 5 (1).5:83–94.
8. Cruz L, Cruz J, Duarte L, Diogo E, Sanchéz C, Rustique L, Inácio, M. L.; Santos, M.T., Sousa E & Ferreira, M. E. (2022). Good practices for disease control in sweet potato crops. Rural Life, June, 62-67.
9. Fernandes, A.C.G., Azevedo AM, Valadares N.R., Rodrigues C.H.O., Brito, O.G., Andrade Júnior, R.V.C. & Aspais I. (2022). Fuzz logic applied to the simultaneous selection of sweet potato genotypes. Horticultura Brasileira, 40 (1), 63-70.
10. Galeriana, T. M., Oliveira, S. L., Pirolé, V. L. B., Receto, M. Q. & Cosmo, B. M.N. (2020). Sweet Potato: A Review with an Emphasis on Nitrogen Dynamics.Revista Tocantinense de Geografia, 9(19), 206-230.
11. Gama, A. B. N. (2020). Selection of sweet potato genotypes with potential use of leaves for human food [ Master's Thesis in Agronomy/Pyrotechnics]. UFLA, Brazil .
12. Hayati, M., Sabahudin, Efendi, A., Anhar. (2020). Morphological characteristics and yields of several sweet potato (Ipomoea batatas L.) tubers.
13. Huamán, Z. (1991). Descriptors for Sweet Potato's, editor. International Board foodplants Genetic Resources, Rome, Italy.
14. Jayasinghe, U., Setiawan, A., Kipuka, P., Piggin, C. & Palmer, B. (2003). Performance of some CIP sweet potato clones under East Timorese conditions. ACIAR Procedeis 113, 84-89.
15. Lebot, V. (2009). Tropical root and tuber crops: Cassava, sweet potato, yams and aroids. Crop Production Science in Horticulture Series, CIRAD. United Kingdom
16. Marouelli, L. P., Buzo, G. S. C., Magalhães, J. S., Ferreira, C. F. & Torres, A. C (2005). Study of the genetic variability of plants from the somatic embryogenesis of sweet potato genotypes using RAPD markers. Embraga; Brazil.
17. Moreira, J.N., Queiroga, R.C.F., Sousa Júnior, A.J. L. & Santos, M.A. (2011). Morphophysiological and productive traits of sweet potato cultivars in Mossoro, RN Revista Verde, 6(1), 161 – 167.
18. Molins, M.M., Bento, C.S., Santos Júnior, A.C., & Rodrigues, R. (2014). Characterization of sweet potato accessions based on morphological characteristics. Online Perspective: Biol. & Health, 13(4), 23-36.
19. Nascimento, K.O., Rocha, D. G. C. M., Silva, E. B, Barbosa Júnior, J. L. & Barbosa, M. I. M. J. (2013). Chemical characterization and nutritional information of organic and biofortified sweet potato starch (Ipomoea batatas L.). Green Journal of Agroecology and Sustainable Development,8 (1), 132-138.
20. Nunes, H.P. (2016). Sweet potatoes (L. Lam.) in the fields and backyards of the coast of São Paulo: Genetic diversity based on geometric morphometry, descriptors and bioethanol production. [PhD thesis, in Genetics and Plant Breeding]. University of S. Paulo (USP), Luiz de Queiroz College of Agriculture.

21. Pereira, E.B., Valadares, N.R., Costa, L.F., Miranda, H.A.F., Pereira, D.E.A., Lopes, I.M.G., Silva. L.F., Silva, I.R., Souza, T.F. & Paula, M. T. A. (2021). Use of sweet Potito brunch for ensiling: Literature review
22. Perrud, A.C., Barrisco, L.G., Zeit, A.R., Leal, M.H.S., Silva Júnior, A.D, Resende, J.T.V, Silva, M.L & Troco, B.R. (2021). Relationship between bud number in seed branches and yield aspects of sweet potato. Horticultura Brasileira, 39(4), 451-457.
23. Reis, E., Melo, P., Andrade, R. & Calapez, T. (2018). Applied Statistics v. 2(6th Ed.) tag. Edições Sílabo, Lda.
24. Soares, F., Pereira, L.C.R., Belo, J.B.B., Brito, D.R. & Moisés, A. (n.d.). Variety fehuk midar Cip83 on site Baucau neebé propose ba release or swing. MAP-RDTL.
25. Sørensen, T. (1948). A method of establishing groups of equal amplitude in plant sociology based on similarity of species content - and its application to analyses of the vegetation on Danish commons, BIOLOGISKE SKRIFTER, 5(4).
26. Valadares, N.R., Fernandes, A.C.G., Rodrigues, C.H.O., Silva, M.T.N.L., Silva, R.B., Inácio, K.B., Ferreira. J.L. & Azevedo, A.M. (2022). Banezian approach in the evaluation of age dissimilarity in sweet potato clones.
27. Williams, R., Soares, F., Pereira, L., Belo, B., Soares, A., Setiawan, A., Browne, M., Nesbitt, H. & Erskine, W. (2013). Sweet potato can contribute to both nutritional and food security in Timor-Leste. Field Cross Research, 146, 38-43
28. Research article. ISSN 2835-6276. Tilman CB., (2023), https://ajmcrr.com