Phenology and growth of lulo (*Solanum quitoense* Lam) plants grafted onto *Solanum hirtum* Vahl.

Fenología y crecimiento de plantas de lulo (*Solanum quitoense* Lam) injertadas sobre *Solanum hirtum* Vahl.

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Lulo crop in La Unión-Nariño (Colombia).
Photo: D.E. Duarte

ABSTRACT

Lulo (*Solanum quitoense*) is a promising Andean fruit tree that is highly valued in international markets because of its nutritional characteristics, flavor, aroma, and high content of vitamins A and C with antioxidant properties. However, certain sanitary problems, such as *Fusarium oxysporum* and soil nematodes, pose challenges to the competitiveness of lulo crops. Cultivating lulo plants grafted onto resistant patterns, such as *S. hirtum*, is a plausible solution to these sanitary issues; so, determining the behavior of grafted plants is relevant. In this study, the phenology and growth dynamics of grafted lulo plants were evaluated with functional analyses based on thermal time (degree days-DD). Completion of the vegetative phase of the lulo required 561 DD from planting to the onset of flower bud sprouting, 715 DD to reach anthesis, 801 DD for fruit set, and a cumulative total of 2,464 DD to reach fruit ripening. The functional analyses showed that Richards's model fit the dynamics of the growth variables (height, leaf area index, crop growth index, total dry weight, leaf dry weight, and stem dry weight). Of the total plant dry biomass, 39.7% corresponded to the stems, 33.8% was from the fruits, 15.54% was from the leaves, 10.56% was from the roots, and 0.4% was from the flowers. The yield was not affected by the grafting process of lulo *S. quitoense* onto *S. hirtum* stocks; on the contrary, the crop population and productivity were maintained for a longer time.
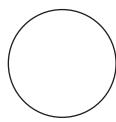
Additional key words: plant phenology; functional analysis; day-degrees; allometry; partition.

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RESUMEN

El lulo (*Solanum quitoense*) es un prometedor árbol frutal andino muy apreciado en los mercados internacionales por sus características nutricionales, su sabor y aroma, y su alto contenido de vitaminas A y C con propiedades antioxidantes. Sin embargo, ciertos problemas sanitarios, como *Fusarium oxysporum* y nematodos del suelo, plantean problemas para la competitividad del cultivo del lulo. Al respecto, el cultivo de plantas de lulo injertadas en patrones resistentes, como *S. hirtum*, es una solución plausible a estos problemas sanitarios y, por lo tanto, determinar el comportamiento de las plantas injertadas es una cuestión relevante. En este estudio se evaluó la fenología y la dinámica de crecimiento de las plantas de lulo injertadas mediante análisis funcionales basados en el tiempo térmico (grados día-DD). La finalización de la fase vegetativa del lulo requirió 561 DD desde la plantación hasta el inicio de la brotación del botón floral, 715 DD para alcanzar la antesis, 801 DD para el cuajado de los frutos y un total acumulado de 2.464 DD para alcanzar la maduración de los frutos. Los análisis funcionales mostraron que el modelo de Richards se ajustaba a la dinámica de las variables de crecimiento (altura, índice de superficie foliar, índice de crecimiento del cultivo, peso seco total, peso seco de la hoja y peso seco del tallo). Del total de la biomasa seca de la planta, el 39,7% correspondía a los tallos, el 33,8% a los frutos, el 15,54% a las hojas, el 10,56% a las raíces y el 0,4% a las flores. El rendimiento no se vio afectado por el proceso de injerto de lulo *S. quitoense* en *S. hirtum*; por el contrario, la población de los cultivos y su productividad se mantuvieron durante más tiempo.
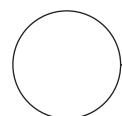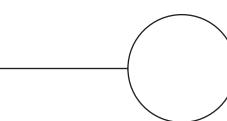
INTRODUCTION

In Colombia, the total crop area for lulo (*Solanum quitoense* Lam.) in the productive stage in 2018 was 8,821.3 ha with a production of 89,050 t of fruits and an average yield of 10.09 t ha^{-1}. In the same year, the Department of Huila was the highest producer, with 14,340 t, followed by Valle del Cauca, Antioquia, Boyaca, and Cauca (Agronet, 2020). Lulo is one of the most promising fruit crops for the Andean region, thanks to its good organoleptic characteristics and unique aptitude for the agro-industry (Gallo *et al*., 2018).

Lulo is susceptible to sanitary issues that limit crop production and cause high losses for producers. Therefore, creating disease-tolerant plants is necessary for ambitious exportation projects (Criollo *et al*., 2014). Also, the lulo production system has severe limitations associated with technological, phytosanitary, and commercial factors that threaten sustainability (Muñoz *et al.,* 2013). According to Muñoz (2010), the main problems in lulo crops are *Meloidogyne incognita*, which affects water and nutrient uptake, *Neoleucinodes elegantalis,* which perforates fruits and induces premature fruit drop, *Colletotrichum gloesporioides,* which causes fruit rotting, *Sclerotinia sclerotiorum* or cottony soft rot, *Phytophthora* sp., which leads to dark lesions in the leaves and stems, defoliation, and plant death, and *Fusarium oxysporum,* which affects roots and causes plant death (Noboa and Viera, 2020; Benítez *et al*., 2020).

Grafting fruit tree species, such as lulo, is a promising technique used for the vegetative propagation of outstanding plants, in which the rootstock is disease-tolerant or resistant (Rojas *et al.,* 2004). Considering the resistance of several wild Solananceae species to *Fusarium oxysporum* and *Meilodigine incognita* (Arizala *et al*., 2011; Clements *et al*., 2016; Navarrete *et al*., 2018; Vargas *et al*., 2018). There are studies on lulo plants grafted onto resistant rootstocks, such as *Solanum hirtum;* however, the behavior of these grafts and their implications on crop productivity and fruit quality are unknown.

An important aspect when evaluating grafted lulo plants is the rhythm of the appearance of vegetative and reproductive structures, which depends on the interaction of biotic and abiotic factors (Browning *et al*., 2019). According to Casiano and Paz (2018), anthropic and climatic effects can cause variations in growth patterns and the appearance of plant structures. Thus, site growth conditions, such as climate, soil and plant management, can affect the duration of phenological stages (Fischer and Melgarejo, 2020).

The flowering stage is the most sensitive. Luo *et al*. (2015) stated that the ambient temperature affects crop growth, development, and production since there are specific temperature requirements to complete each stage of the life cycle. Lulo crops show adequate development in zones with temperatures of 15-24°C, with an optimum of 20°C (Sánchez-Reinoso *et al*., 2019). Water and energy balance are also significantly affected by temperature (Sacks and Kucharika, 2011).

To determine the effects of the environment and genetic composition of plants on biomass accumulation, techniques with plant growth analysis are needed to accurately estimate productivity variables with simple measurements, such as leaf area (LA), leaf area index (LAI), crop growth index (CGI), and biomass (Poorter and Sack, 2012). According to Di Benedetto and Tognetti (2016), evaluating crop growth in response to agronomic modifications, such as grafting, requires growth analysis techniques that can be statistically validated.

The growth rate of different plant structures largely determines the partition of assimilates and plant productivity. The balance between the energetic demand of plant organs and the photosynthetic contribution of plants must be considered. The efficiency of this partition will affect the composition of the total biomass and, particularly, the distribution of photosynthates to commercially-important organs (Ochoa-Vargas *et al*., 2016). Crop production seeks to enhance conditions for longer periods of high productivity, with efficient partitioning, achieved with an adequate source-sink relationship (Barrientos *et al*., 2015). This study aimed to analyze the crop phenology, growth dynamics, and yield of lulo (*Solanum quitoense* var. *quitoense*) plants grafted onto *Solanum hirtum* plants*.*

MATERIALS AND METHODS

The study was conducted on the Instituto Educativo de Desarrollo Rural I.E.D.R Farm, in the municipality of La Union, Nariño, located at an elevation of 1,782 m a.s.l., at 1°35'15" N and 77°07'32" W, with an average temperature of 19.32°C, average relative humidity of 78%, and total cumulative precipitation of 1,512.6 mm.

The soil of the experimental plot was composed of volcanic ash and sand with a pedological content of 70% Typic Hapludands and 30% Typic Fulvudansds, characterized by a first horizontal layer to a depth of more than one meter (González and Salamanca, 2008). The soil analysis showed adequate contents of organic matter (3.28%), potassium (0.43 cmol kg^{-1}), and minor elements (in mg kg^{-1}: Mn = 6.8, B = 0.6, Fe = 26.72, Zn = 2.1), with a slightly acidic pH (5.6); low contents of calcium (2.3 cmol kg^{-1}), magnesium (1.2 mg kg^{-1}), and phosphorus (16.43 mg kg^{-1}); apparent density (1.09 kg dm^{-3}), sandy loam texture, and 17% slope.

The plant material was produced by grafting lulo de castilla (*S. quitoense* var. *quitoense*) onto *S. hirtum* rootstocks. When the *S. hirtum* plants reached a diameter of 8-10 mm, they were cut at a height of 10 cm and grafted with *S. quitoense* twigs that were tied with plastic tape and covered with a plastic bag for 1 week to prevent dehydration. After 1 month, the plants were transferred to the field. The grafted plants were sown in 0.3 × 0.3 × 0.3 m holes, arranged in five rows of 13 plants each with a distance of 3 m between rows and 2 m between plants. The planting density was 1,666 plants/ha. 80 g of dolomite lime were added to each hole, and 1.2 kg of organic matter were added to each hole (20 d before planting).

Plant nutrition was guaranteed through bimonthly fertilizer applications after planting with urea, DAP (diammonium phosphate) as a source of phosphorus and nitrogen, and potassium chloride as a source of potassium. For the first application, 15 g urea + 12 g DAP were mixed; after two months, 25 g urea + 20 g KCL (potassium chloride) + 15 g DAP were used, with a third application of 30 g urea + 30 g KCL + 20 g DAP. The subsequent applications consisted of 40 g urea + 35 g KCL + 25 g DAP.

Phenological analyses were performed by evaluating the thermal time, which indicated the degree-days (DD) necessary for the grafted lulo plants to change their phenological stage. The DD was calculated with the difference between the mean daily temperature and a base temperature (*Tb*) of 9.61°C (Matzarakis *et al.,* 2007; Pulido *et al*., 2008) (Eq. 1):

$$DD = \sum \left(\frac{Tmax + Tmin}{2} - Tb \right) \qquad (1)$$

The growth was evaluated every month in two plants select randomly, measuring their height and dry weight of the root, stem, leaves, flowers, and

fruits. The leaf area (LA) was calculated based on 100 measurements of lulo leaves, following the method proposed by Rincón *et al*. (2012), using ImageJ and fitting them to a regression model with CurveExpert, with equation 2 (R^2=0.97):

$$LA = 133.05 - 7.35x + 0.85\,x^2 \qquad (2)$$

This information was used to calculate the leaf area index (LAI), which is the ratio between the LA and the ground area occupied by the plant (Criollo *et al*., 2019) (Eq. 3).

$$LAI = \left(\frac{LA}{GA} \right) \qquad (3)$$

Similarly, the crop growth index (CGI) was calculated based on the model proposed by Aguilar-Campo *et al*. (2015), modified by the thermal time (Eq. 4):

$$CGI\ (g\ m^{-2}\ DD^{-1}) = \frac{TDW_2 - TDW_1}{DD_2 - DD_1} \times \frac{1}{GA} \qquad (4)$$

where, $TDW_{1,2}$ is total dry weight at the beginning and end of the stage, $DD_{1,2}$ is the thermal time of the interval, and GA is the ground area (m²).

The yield was estimated based on the weight of ripe fruits at harvest (85% orange in color on the surface) produced by four selected plants during a period of eight harvests, evaluated every 15 d. All variables, except for those related to phenology, were functionally analyzed to evaluate their dynamics based on the cumulative thermal time throughout the plant life cycle. Behavioral models for the lulo grafts were selected according to the highest R^2 values and lowest deviations. Models were determined using CurveExpert v 1.4.

RESULTS AND DISCUSSION

Phenology and thermal time

Onset of flowering in the grafted lulo plants, which is determined by the appearance of the first flower buds, required 561 DD from the moment of planting. This requirement is very similar to the one found by Cruz *et al*. (2007) under greenhouse conditions, with a value of 528 DD, indicating a difference of approximately 3 d. The flower opening stage, or anthesis,

required 715 DD from the moment of planting, which indicated a requirement of 154 DD to transition from flower bud to open flower in grafted plants. This requirement agrees with Muñoz (2010), who estimated a thermal time of 723 DD to reach anthesis, indicating that the grafting process did not affect the thermal time requirement. However, Viteri *et al.* (2006) reported that grafted plants showed higher precocity in flowering than non-grafted plants, demonstrating that the degree of maturity of the grafted buds and the interaction between different environmental conditions, such as high temperature, high soil humidity, quality and quantity of solar radiation and genotype, can affect the ontogenetic stages of the plants (Silva *et al*., 2015; Serna, 2017).

Fruit set required 86 DD after anthesis, contributing to a cumulative total of 801 DD from planting. This confirmed that the propagation of lulo de castilla with grafts does not affect the thermal time requirement for fruit set. The results of this study agrees with Jurado *et al.* (2013), who did not report statistically significant differences between the time required for fruit set in *S. quitoense* and *S. quitoense* grafted onto *Solanum* spp.; furthermore, fruit set was not influenced by the rootstock.

The *S. quitoense* fruits reached harvest maturity when thermal time reached 2,464 DD. The transition from fruit set to ripening had the highest thermal time requirement (1,663 DD), which may have been due to environmental conditions such as an average temperature of 19.47°C, a thermal amplitude of 11°C, a relative humidity of 74% and a precipitation of 893.5 mm. These conditions delay the ontogenetic period of harvest maturity. The duration of each stage, as opposed to the need for thermal time, can vary depending mainly on temperature, radiation and soil humidity (Medina *et al*., 2008).

Functional growth analyses

Plant height (PH). The growth analysis showed individuals with heights of 1.70 m at the end of the evaluation (2,464 DD). The growth dynamics of PH were fitted to Richards model with an R^2=0.98 (Fig. 1); this model did not require destructive methods because it visualized the behavior of growth and other variables (López-Cruz *et al*., 2005) based on thermal time. This behavior agrees with the results of Arizala *et al.* (2011), who showed similar dynamics in grafted lulo plants.

Figure 1A shows that, by the end of the evaluation, the increase in plant height was less marked because of the architecture of the plants. In particular, plant growth is vertical during the first stages, whereas, during development, growth is redirected towards the secondary stems in the search for greater solar radiation interception.

Leaf area index (LAI). The LAI reached its highest value by the end of the evaluation, 1.13. This index increased slowly at first, yet, after 1,000 DD, it rose rapid and ended at 2,400 DD. The LAI trend was fit to Richards model with an R^2=0.99 (Fig. 1B). These results agree with Taiz *et al*. (2017), who confirmed that, in the first growth stages, there was little development of the leaf area, resulting in a low LAI. A higher LAI can improve the physiological behavior of a plant by increasing the area of solar radiation interception and photosynthetic production. Similarly, Almanza *et al.* (2008) evaluated the LAI dynamics in *S. quitoense* plants in response to different fertilizers, demonstrating that fertilization can affect this variable positively, i.e. the higher the fertilization, the higher the LAI.

Crop growth index (CGI). Figure 1C shows the dynamics of the CGI, which had an initial value of 0.03 g m^{-2} DD^{-1}. This result was explained by plant stress from the grafting process, which caused slow growth in leaf area and biomass. After that, a period of rapid growth was observed until 2,681 DD, reaching a CGI of up to 8.79 g m^{-2} DD^{-1}. At this point, the CGI decreased to 1.37 g m^{-2} DD^{-1} at 3,252 GD. The CGI behavior was fitted to a Gaussian model with an R^2=0.95.

The CGI reached a maximum thermal time of 2,681 DD when the LAI was 1.0. This was followed by a reduction that was likely due to overshading from adjacent plants with wide and uneven leaf coverage that could not be controlled in the experiment area, which can affect photosynthetic efficiency and biomass accumulation. A high CGI indicates a greater efficiency of biomass production per unit of soil. In this sense, Jerez *et al*. (2016) stated that CGI is an index of agricultural productivity for which high values indicate high production of organs of interest for harvesting, contributing to higher yield.
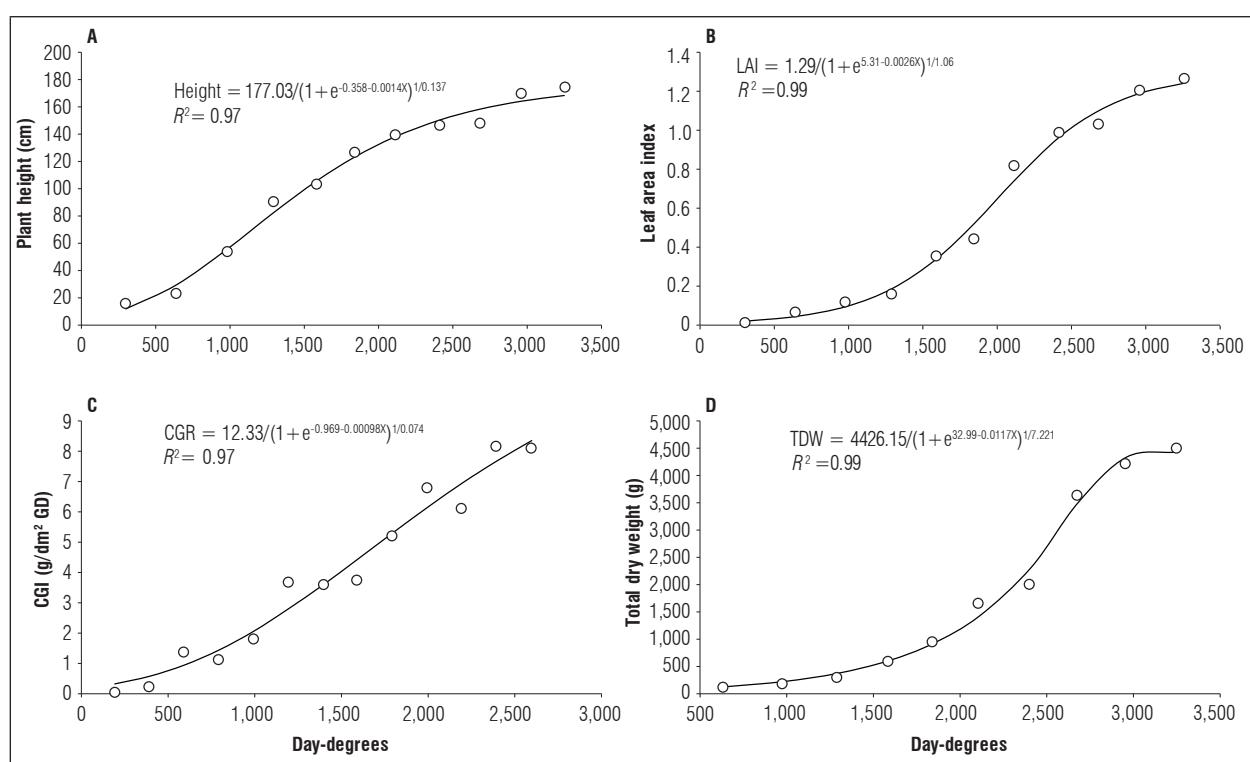

Figure 1. Dynamics of A) Height, B) Leaf area index, C) Crop growth index, and D) Total dry weight of *S. quitoense* plants grafted onto *S. hirtum* stocks, as a function of thermal time (DD).

Total dry weight (TDW). Plants distribute their cumulative biomass between vegetative and reproductive structures according to the plant's priorities (Cardona *et al*., 2016). The total dry weight, including the dry weight of the different plant organs (roots, stems, leaves, flowers, and fruits), showed an initially slow growth; however, the TDW reached 4,487.5 g at 3,252 DD and the end of evaluations. The behavior of this variable was fit to Richards model with an R^2=0.99 (Fig. 1D).

The gradual and constant increase in dry weight of the grafted lulo plants agrees with reports by Medina *et al*. (2008). However, our results differ from earlier findings by Cruz *et al.* (2007) in non-grafted lulo plants, which showed reduced total biomass after 2,962 DD, caused by biotic factors such as *Meloidogyne* spp. and *Fusarium* sp., with higher incidence after eight months of planting.

Leaf dry weight (LDW). As shown in figure 2A, there was a constant increase in LDW until the end of the evaluation with a cumulative LDW of 697 g at 3,252 DD. The behavior of this variable was fit

to Richards model (R^2=0.98). At 640 DD, the LDW accounted for the largest fraction of the total dry weight, while, at 983 DD, it was exceeded by stem dry weight (SDW) and had a final contribution of 15.54%. Similar results were reported by Cruz *et al.* (2007), who found that SDW exceeded LDW at 600 DD after planting.

Stem dry weight (SDW). The stems accounted for the largest fraction of the total dry weight of the lulo plants. Initially, the leaves contributed the most biomass but, by the end of the third evaluation, the stems showed the highest increase in dry matter, as compared to other organs (39.71%). The cumulative stem dry weight increased to a maximum value of 1,782 g at 3,252 DD. This behavior was fit to Richards model with an R^2=0.98 (Fig. 2B). The same trend was described by Cruz *et al*. (2007), who reported that, in non-grafted *S. quitoense,* stems contributed the majority of dry biomass to the total dry weight. Di Benedetto and Tognetti (2016) stated that the aerial part:root ratio aids understanding of the partition of assimilates, and the ontogeny of each organ as a proportion of carbon accumulation is affected, which is

A) $LDW = 716.57/(1+e^{4.96-0.00249X})^{1/0.966}$, $R^2 = 0.98$

B) $SDW = 1742.29/(1+e^{49.49-0.017X})^{1/10.43}$, $R^2 = 0.98$

C) $RDW = 87.30 -0.18X+1.3E\text{-}004X^2-1.17E\text{-}008X^3$, $R^2 = 0.96$

D) $FDW = 20564.67e^{8160.62/X}$, $R^2 = 0.95$
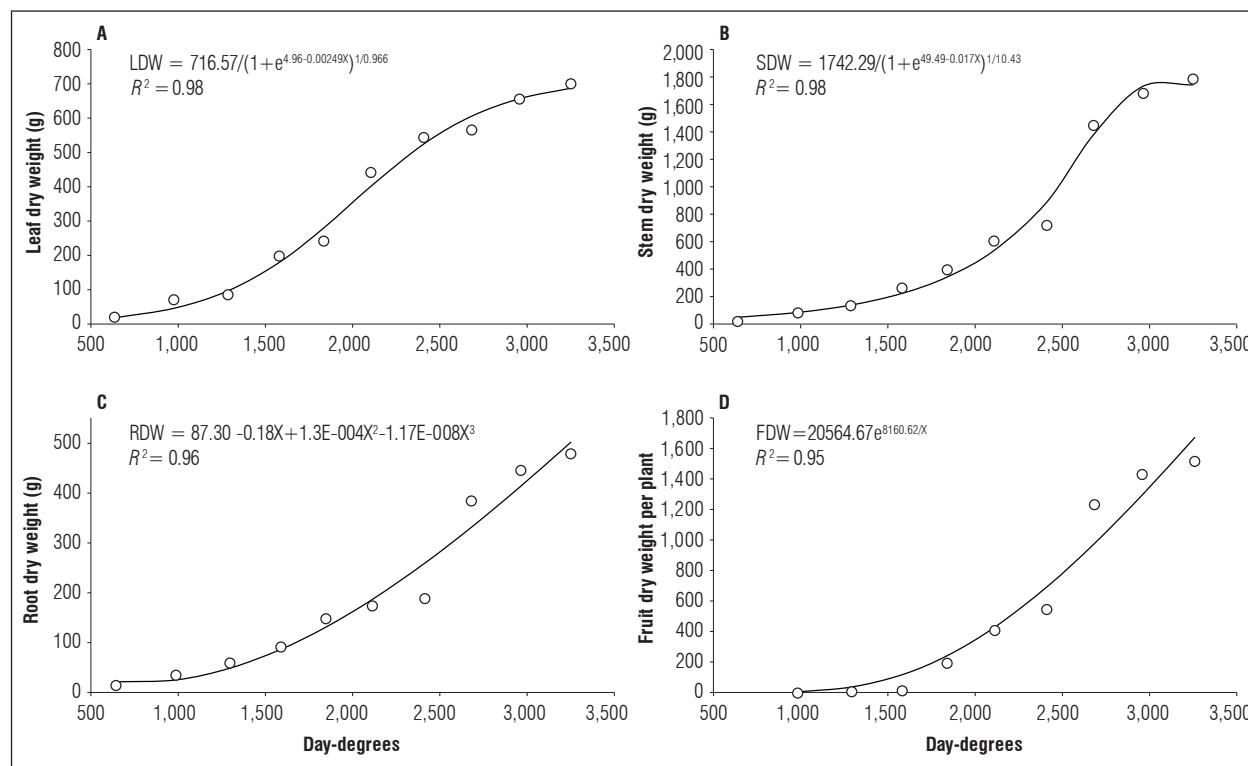
Figure 2. Behavior of A) leaf dry weight, B) stem dry weight, C) root dry weight, and D) fruit dry weight of lulo plants grafted onto *S. hirtum* stocks, as a function of thermal time.

higher in stems than other organs (e.g. leaves) as time passes.

Root dry weight (RDW). Figure 2C shows a constant increase in RDW throughout the evaluation period, to a maximum of 473 g at 3,252 DD, which represented 10.56% of the total dry biomass. The RDW dynamics were fit to a cubic polynomial model (R^2 = 0.96). The constant increase in RDW differed from other studies on non-grafted plants that reported a rapid decrease in RDW after two months because of sanitary issues caused by nematodes or *Fusarium* sp. (Cruz *et al*., 2007; Gelpud *et al.,* 2010). A lower increase in biomass is due to a slower plant metabolic rate since active root tissue is suppressed and water and nutrient flow are mechanically disrupted (Jacquet *et al.,* 2005).

Flower dry weight (FDW). The FDW showed a gradual increase up to 17.4 g at 3,252 DD, equivalent to 0.40% of the total dry weight. The cumulative flower dry matter was fit to a quadratic model (R^2 = 0.98): FDW = $-2.63 + 2.03X - 0.025X^2$

Flower structures are short-lived in plants, and, on average, no more than one-third of flower buds contribute to fruit set. This observation agrees with Cruz *et al*. (2007) and Medina *et al.* (2008).

Fruit dry weight (FDW). Figure 2D shows a constant increase in FDW from onset of fruit production at 801 DD until the end of the experiment, reaching a FDW of 1,516 g at 3,252 DD. The dynamics of the dry fruit weight trend fit an exponential model (R^2=0.95). The FDW was the second most significant fraction of the TDW, after SDW, because it contributed 33.78% of the total plant dry weight. This finding agrees with Medina *et al.* (2008), who reported that fruits of non-grafted lulo plants (*Solanum quitoense* var. quitoense) accounted for 25 to 30% of the total dry plant weight between 11 and 12 months after planting.

Yield (Y). The yield was one of the most relevant variables because it facilitates decisions based on cost-effectiveness. The harvest started at a cumulative thermal time of 2,464 DD and finalized at 3,252 DD after eight harvests. The yield was 6,503 kg ha^{-1} by the end of the harvest. The fruit yield was 3.9 kg/plant, obtained from eight harvests of lulo plants grafted onto *S. hirtum*. These results agree with Silva *et al*. (2015), who reported a productivity of 6.0 kg/plant and fruits with a weight of 110 g in a promising *S. quitoense* genotype. Additionally, 30.67% of the

yield included fruits with a polar diameter greater or equal to 65 mm, 53.18% corresponded to fruits with an equatorial diameter greater than 60 mm and less than 65 mm, and 16.15% of fruits showed an equatorial diameter lower than 60 mm.

CONCLUSION

Lulo plants (*Solanum quitoense*) grafted onto *Solanum hirtum* rootstocks needed a thermal time of 561 DD to reach the flower bud stage, 715 DD for anthesis, 801 DD for fruit set, and 2,464 DD to reach fruit ripening. Based on the cumulative thermal time, the dynamics of plant height, leaf area index, total dry weight, and total stem and leaf dry weight were fit to Richards model, while the crop growth index was fit to a Gaussian model. The root dry weight was fit to a third-degree polynomial model, the flower dry weight was fit to a quadratic model, and the fruit dry weight was fit to a modified exponential model. The yield was not affected by the grafting process; conversely, the crop population and productivity were maintained for a longer time.

Conflict of interests: The manuscript was prepared and reviewed with the participation of the authors, who declare that there exists no conflict of interest that puts at risk the validity of the presented results.

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Hernando Criollo Escobar
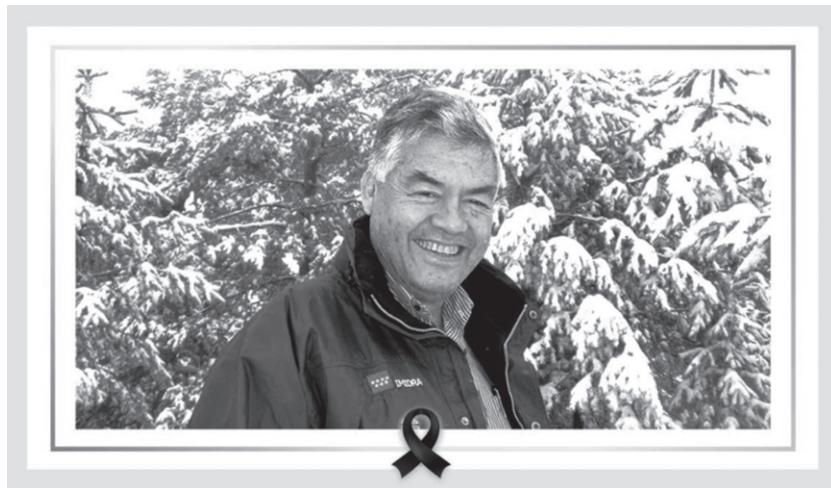
"La muerte es el comienzo de una historia de amor que viviremos eternamente con Dios y con los seres que amamos. Muchas personas fallecen diariamente en el mundo, pero aquellas que por sus obras trascienden y nos reconcilian con la humanidad, son pocas".

El Doctor **HERNANDO ARTEMIO CRIOLLO ESCOBAR**, fue fundador e integrante del Grupo de Investigación en Producción de Frutales Andinos. Dedicó veinte años de su vida académica y científica a la producción de conocimiento, a estructurar y fomentar proyectos de investigación, con los cuales impulsó el crecimiento social y económico de la agricultura y la educación superior del departamento de Nariño.

El Grupo de Investigación en Producción de Frutales Andinos reconoce y exalta los innumerables aportes realizados por el Doctor **HERNANDO ARTEMIO CRIOLLO ESCOBAR** en la educación, investigación y extensión rural, los cuales fueron un factor de desarrollo para las ciencias agrarias y un aporte significativo a la acreditación de los programas de Ingeniería Agronómica e Ingeniería Agroforestal de la Facultad de Ciencias Agrícolas.

El Grupo de Investigación en Producción de Frutales Andinos rinde homenaje póstumo a un hombre destacado, sensible y especial profesional de las ciencias agrarias, de vocación y rigor científico indiscutible.

Su admirable dedicación al trabajo científico lo hizo merecedor de varias distinciones, fue autor de 69 artículos científicos, tres libros de investigación, tres libros de texto y asesor de innumerables tesis de pregrado y postgrado.

El Grupo de Investigación en Producción de Frutales Andinos lamenta profundamente el sensible fallecimiento de su fundador, **Dr. HERNANDO ARTEMIO CRIOLLO ESCOBAR** y le expresa a su Señora madre Rosita Escobar, a sus hermanos Rubiela y Rodrigo Criollo Escobar, a su esposa Johana Muñoz, a sus hijos Paola Fernanda, Claudia Patricia, Karime Ivonne, Ruth Amanda, Edgar Hernando, Luis Carlos y Andrés Felipe Criollo, un profundo sentimiento de condolencias.

Se firma en San Juan de Pasto, el primero de septiembre del dos mil veinte.

TULIO CÉSAR LAGOS BURBANO

Líder del Grupo de Investigación en la Producción de Frutales Andinos.

Para un amigo

El alma sufre

*Deja las flores que
adornaron la vida.*

Comienza el viaje

El camino se hace cierto

*La luz brillante
marca el ascenso*

*A lo lejos, lo espera con brazos
abiertos el gran anfitrión*

*El guía el destino del
alma hacia su hamaca
de hilos de seda*

Abierto el cielo inmenso

Enmudece el rumor terrenal

*El susurro del viento celestial
alegra al viajero que pronto
encontrará su destino.*

*Nubes blancas adornan
su llegada,*

*Música al alma, es el gran
premio para el viajero*

Hasta pronto querido hermano.