Original Research Article

Production of citrus rootstock in the Santa Luzia do Induá Community, Capitão Poço-Pará-Brazil

ABSTRACT

The municipality of Capitão Poço, located in the state of Pará / Brazil, received the demonization of land from the orange, with citriculture as the main source of income for the producers in the municipality. Among the sectors of citrus production, the production of the rootstock, which is strongly developed in the community of Santa Luzia do Induá, is a highlight in the activity, since this sector is considered as a strong element for the job creation, capital formation, value added and also in regional development, which strengthens the production of seedlings in the municipality. In this sense, the research had as objective to make a survey of the form of production of the rootstock of citrus seedlings, in the community of Santa Luzia do Induá, municipality of Capitão Poço/Pará. Field research was carried out between December 2017 and January 2018 in the community of Santa Luzia do Induá. The research was carried out based on the application of semi-structured questionnaires, addressing aspects on the production of rootstock on the choice, production, management and classification, as well as the production of grafting. Fifty seedlings producers were randomly interviewed, out of a total of approximately 100 nurseries, which guarantees a representative sample unit. It is observed that 48% of the nurserymen consider the thickness as the main factor for the execution of the grafting, and for them the horse is ready when it reaches the thickness of a pencil. Regarding the height, the most used for grafting by the producers (86%) is that between the intervals of 10 to 20 cm. The producers reported that the most used is the lemon tree clove due to its genetic and phytotechnical characteristics. It was noticeable that they are already trying to improve techniques for acquiring higher quality propagation material. To this end, the encouragement of public policies combined with the development of technologies appropriate to the local reality is paramount to increasingly promote seedlings production in the community.

Keywords: Cavalinho, citriculture, grafting, lemon lime, nursery

1. INTRODUCTION

Brazil is the world's largest producer of oranges, being the most cultivated fruit in the country, with annual production of approximately 17.55 million tons of fruit in 2013, and gross production value of approximately 3.4 billion dollars. In 2015, the harvested area of about 652,131ha was harvested, with a production of 14,693,496 tons of orange and an average yield of 22.53 tons / ha, with the Southeast and Northeast being the main producing regions [1].

In the state of Pará, these crops (lemon, orange and tangerine) are among the most produced, being responsible for the generation of direct and indirect jobs. Citriculture is one of the agricultural sectors that is constantly expanding in the country, where it has increasingly become a power of great socioeconomic importance and appreciation in the foreign market. The state has two citrus and citrus free areas: the Captain Poço microregion, encompassing the municipalities of Capitão Poço, Garrafão do Norte, Irituia, Nova Esperança do Piriá and Ourém; and Monte Alegre, joining the municipalities of Alenquer, Belterra, Mojuí dos Campos, Prainha and Santarém. The creation of the pole comes to strengthen the Paraense citriculture, converging efforts in all segments, both state and federal, for the socioeconomic development of the state [2, 3, 4].

Capitão Poço is considered the land of orange, with citricultura being the main source of income of the producers in the municipality. Among the sectors of citrus production, the production of the rootstock, which is strongly developed in the community of Santa Luzia do Induá, rural area of the city stands out. The community is a reference in this activity, since this sector is considered as a strong element for the generation of jobs, capital formation, value added and also in regional development, which strengthens the production of seedlings in the municipality.

The production of citrus seedlings begins with the obtaining of seeds taken from fruits produced in registered plants. This is accomplished by the grafting of a bubble (vegetative yolk that will give rise to a plant equal to which it was removed) in a rootstock, usually obtained by seed. By this method, a crown / rootstock combination is obtained that combines desirable characteristics, such as adaptation of the plant to the various conditions of soil, climate, diseases and production systems, allowing a high production of fruits with the desired quality [5].

The production of rootstocks is one of the fundamental steps in the formation of seedlings of fruit trees of quality. Strong, well-formed rootstocks can improve and positively influence the rate of graft adhesion. In fact, it is of perfect compatibility and physiological attunement that depends largely on the success of the graft / graft relationship [6].

There is still a lack of information about this issue in the region, which becomes a limiting factor for the development of knowledge about door production. With this, the study should provide the nurserymen with more knowledge about the cultivation system developed in the community, being important information that can serve as a basis for the development of future research that will contribute more and more to the potentiating of the production of the rootstock of citrus in the community.

In this sense, the research had as objective to make a survey of the form of production of the rootstock of citrus seedlings, in the community of Santa Luzia do Induá, municipality of Capitão Poço / Pará/ Brazil.

2. MATERIAL AND METHODS

The field survey was carried out between December 2017 and January 2018, in the community of Santa Luzia do Induá, belonging to the rural area of the municipality of Capitão Poço / PA, with a distance of approximately 13 km from the municipality's headquarters (Figure 1). This community stands out in the production of citrus seedlings, these being produced by small, medium and large nurseries, which is thus the main agricultural activity developed in the community.

The municipality of Capitão Poço is located in the Guamá micro-region, characterized in the agricultural sector, as one of the largest citrus producers in this region. This fact can be attributed to soil and climatic conditions, such as climate and favorable soil for citrus production growth in Capitão Poço and surrounding municipalities [7]. The climate of the municipality is in the climatic types Am, of the classification of Köppen, characterized like rainy, presenting / displaying small dry season between September and November [8].

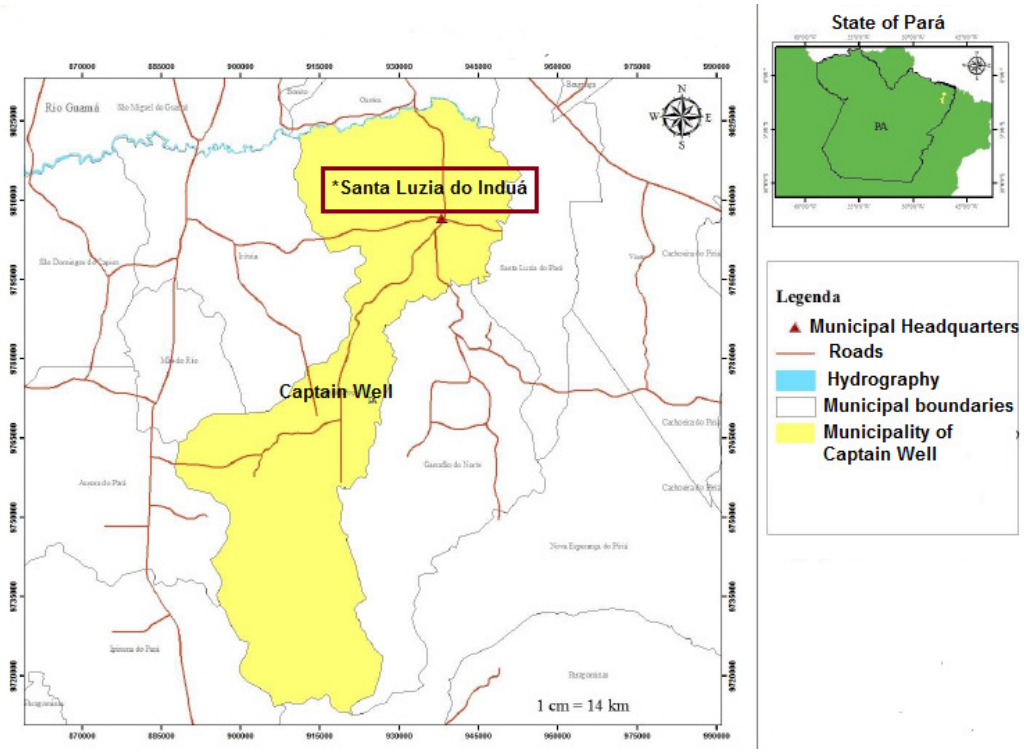

Fig. 1. Geographical location of the community of Santa Luzia do Induá, municipality of Capitão Poço

Initially, a survey of the total number of producers obtained was carried out based on the information collected from the community's own nursery workers. With this, it was possible to define the representative sample of producers that would be interviewed. The research was developed based on the application of semi-structured questionnaires, addressing aspects on the production of the rootstock about the choice, production, management and classification, as well as the production of the grafting.

Fifty seedlings producers were randomly interviewed, out of a total of approximately 100 nurseries, which guarantees a representative sample unit. The interviewees were divided into categories according to the number of seedlings produced and identified by small, medium and large producers (Table 1). The framework of seedling producers carried out with the intention of organizing them based on similar characteristics, thus facilitating the manipulation and discursion of the data.

Table 1. Classification of seedlings producers of Santa Luzia do Induá

Classes	No. of seedlings	No. of interviewees

Small producer	5 up to 10	27
Medium producer	>10 to 50	16
Large producer	Over 50	07
Total		50

The data were tabulated in a spreadsheet Microsoft Excel 2010® and 2013®, where they were manipulated to elaborate Figures and Tables to represent them. Finally, the information obtained was analyzed.

3. RESULTS AND DISCUSSION

The study sought information related to the production of rootstock in the chosen locality. In this sense, it was verified that the grafting technique used by all the producers is the "inverted T" bubble. "Inverted T" bubble is the grafting method most used for its efficiency in the production of the citrus molt, where the graft is a small part of the shell with the insertion of a single gem [9].

The pest is the most used asexual propagation method in the production of citrus seedlings, and when carried out with high quality materials, the results are directly reflected in the formation of seedlings of higher quality and with excellent sanity.

One of the main advantages obtained by the grafting is the maintenance of the genetic characteristics of the plant. The grafting, like any other method of vegetative propagation, allows maintaining the characteristics of the plants (cultivar or superior clones) that are propagated, thus maintaining the agronomic value of the same and, consequently, produces more uniform plants [10].

In Figure 2, the main criteria used for grafting by the producers are presented. It is observed that 48% of the nurserymen consider the thickness as the main factor for the execution of the grafting, and for them the horse (demonization used by the growers to describe the citrus rootstock) is ready when it reaches the thickness of a pencil.

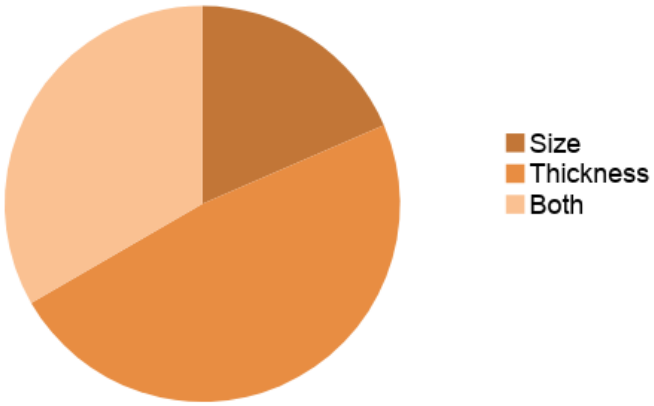

Fig. 2. Criterion used by the seedlings producers of Santa Luzia do Induá, for the classification of rootstocks for grafting

In terms of height, the most used for grafting by producers (86%) is the one between the 10 to 20 cm intervals (Table 2), where it is recommended by Normative Instruction (NI) nº48, approved in 2013 by Ministry of Agriculture Livestock and Supply (MALS) where Article 38 emphasizes that grafting should be done between 10 (ten) and 20 (twenty) centimeters high, measured from the neck of the rootstock. Still in the legislation in its single paragraph, when dealing with true lemons [*Citrus limon* (L.) Burm. F.] or when the seedling is destined for mechanized harvesting, grafting should be done between 20 (twenty) and 40 (40) centimeters, measured from the roots of the rootstock, being duly justified by the technical responsible in the Award of Inspection.

Table 2. Height of grafting performed by the seedlings producers of Santa Luzia do Induá

Classes	Grafting height		
	10 à 20	20 à 30	Others
Small producer	50%	4%	0%
Medium producer	24%	8%	0%
Large producer	12%	2%	0%
Total	86%	14%	0%

When asked about the main rootstocks used in the production of citrus seedlings, the producers reported that the most commonly used is the clove lemon tree (Figure 3). This is due to the preference of the consumers for seedlings grafted with this variety, thus having high demand and appreciation in the market, because it is a rootstock that presents good productivity. Lemon Cravo (*Citrus limonia* Osbeck) is the most commonly used rootstock in Brazil, corresponding to about 85% of the rootstocks used by citrus growers. This rootstock is preferred by nurseries and producers due to its characteristics such as: easy seed acquisition, great vigor in the nursery, rapid growth, good planting seedling glue, early production, compatibility with all varieties of canopy, stress tolerance good adaptation to sandy soils [11].

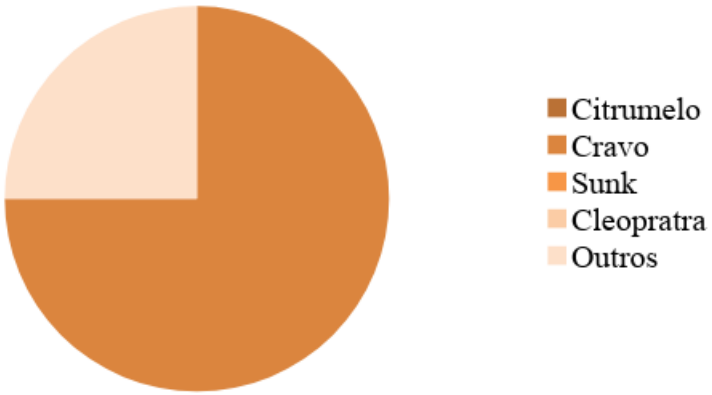

Fig. 3. Principal rootstocks used in the production of citrus seedlings by seedlings producers of Santa Luzia do Induá

The seedlings producers also reported that they use other varieties (25%) of rootstock, being the Volkameriano and Rugoso more cited, but still these varieties are little used by nurserymen, prevails thus the clove lemon tree. In addition, rootstocks have been found to be mostly produced in soil litter, where they spend approximately six months. Subsequently they are transplanted to the definitive site, only one interviewed producers cultivate the shoot graft in tubes (Figure 4).

Fig. 4. Harvesting harvested harvester in willows, in the community of Santa Luzia do Induá A- rootstock seedlings cultivated in tubete and B- rootstock seedlings cultivated in soil

According to Citrolima (2018) [12] and Bastos (2014) [13] and his collaborators (*Citrus limonia* Osb.), The 'Volkameriano' lemon tree (*Citrus volkameriana* Ten.), the citrus 'Swingle' (*Citrus paradisii* x *Poncirus trifoliata*), trifoliate trees (*Poncirus trifoliata* L.) and 'Cleopatra' mandarins (*Citrus reshni* Hort.) and 'Sunki' (*Citrus sunki* Hort.).

The choice of rootstock aims at increasing production, and the particularities of each country or region where it will be used must be respected in order to perform better [11].

The rootstock has an important role on the canopy cultivar, since it influences its characteristics such as precocity of production, vigor, productivity, nutrient uptake and utilization, salinity tolerance, resistance to drought, frost, diseases and pests, besides influencing in the quality and post-harvest of the fruits. In this way, it is verified that not only the choice of canopy is important, but also that of the rootstock, due to the fact that the agronomic characteristics of interest are obtained from the canopy / rootstock interaction [13].

4. CONCLUSION

The criterion most used by seedlings producers for the grafting is the thickness. The height for grafting most required by growers is 10 to 20 cm. As for the main graft port, what prevails is clove lemon, used more frequently by producers.

Therefore, it can also be concluded that the nursery workers for long time working with the activity already have a defined form of production, where the cultivation of the graft is considered the primordial stage to obtain higher quality seedlings and it was perceptible that they already are trying to improve techniques for acquiring higher quality propagation material and that this material is produced according to current legislation. To this end, the

promotion of public policies combined with the development of technologies appropriate to the local reality are essential to increasingly promote the production of seedlings in the community and thus consolidate its production and marketing system.

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