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# Inequality on rice - Productive and social features of Latin American small-scale farmers

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***Abstract***
***Background****: Half of the global population's daily diet includes rice, and though its production ranked globally in third place, rice crops are concentrated in two countries, China and India, which account for 51,3% of global production. Though one could think of large areas with highly technical agro-industrial production, the facts show the opposite: 80% of global rice production is grown by small-scale farmers on farms less than five hectares. Hence, the purpose of this article is to contribute to a better understanding of small-scale farmers growing rice, by analyzing some of their productive and social characteristics, in the case of Latin America in general, and particularly in Brazil, Colombia and Ecuador.*
***Materials and Methods****: The statistical figures offered in this article come from our own calculations based on the Agricultural Area Survey (Ecuador), the National Agricultural Census (Colombia), Censo-Agro (Brazil) and FAOSTAT data.*
***Results****: Our study finds that high levels of inequality accessing land for small-scale farmers, including rice growers, are common; the first reach 77% of the total production units in Brazil, 73% in Colombia and 79% in Ecuador. Analyses also show very low education levels between small-scale rice farmers. For female small-scale farmers and those growing rice, inequality it is even deeper and in the analyzed countries their ownership of the land does not exceed 25%.*
***Conclusions:*** *Despite the enormous difficulties that small-scale farmers must face on a daily basis, their importance is undeniable, since not only do they represent more than 80% of the total agricultural production units in Latin America and the Caribbean, but also 27-67% of food production comes from this sector and also generates between 57 and 77% of agricultural employment. Of all the variables analyzed, the most worrying one, and from which the others are largely derived, is inequitable access to land. It can be observed that despite the fact that small-scale farmers represent the highest proportion among agricultural producers at the national level, they are also the ones who have access to the smallest extension of land to carry out their work.*
***Key words:*** *Latin America small-scale farmers; Latin America rice growers; Latin America small scale rice production; small scale farmers; rice growers productive and social conditions*

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## I. Introduction

Because rice is one of the main products in the daily diet of about half the world's population, its production and consumption figures are massive; with 755 million tons unprocessed in 2019, it ranked third among the most cultivated products in the world, after corn (1148 million tons) and sugar cane (1949 tons) (FAO, 2021). Even so, its production is mostly concentrated in two countries, China and India, which account for 51,3% of rice crops, leaving 48,7% in the hands of the growers from the 123 remaining countries growing this cereal.

If, at first glance, these figures lead us think of a highly technical agro-industrial production on very large areas of land, the facts show the opposite; while in the past decade 50% of cereals and 86% of rice were produced in non-developed countries [1] currently, according to our calculations, 72,6% of cereals and 97,1% of rice are grown by this group of countries and, furthermore, 80% of global rice production is grown by small scale farmers on farms of less than five hectares [2].

Hence, the purpose of this article is to contribute to a better understanding of some of the productive and social characteristics of these small-scale farmers, in Latin America in general, and in Brazil, Colombia and Ecuador in greater depth; the selection of these three countries responds to the fact that, although all three consume rice as their main food and also produce it, their agricultural surfaces and their biophysical characteristics are different, in addition to the fact that some variables analyzed (such as access to land, land ownership, job creation, land Gini and the organization around this product, among others) have their peculiarities.

As for materials and methods the databases used are all publicly accessible; in national cases, they were those of the Survey of Agricultural Area and Production [3] carried out by the National Institute of Statistics and Censuses (INEC for its acronym in Spanish) of Ecuador in 2018, the National Agricultural Census [4] carried out in 2014 by the Administrative Department National Statistics Office of Colombia (DANE for its acronym in Spanish) and the information system on the data obtained from the Census-Agro [5] made in 2016 by the Brazilian Institute of Geography and Statistics (IBGE for its acronym in Portuguese). The calculations with these databases were complemented with the data that FAOSTAT offers at a global level [6]; all calculations based on this data were made by the author.

So, this article reads as follows: section 2 offers data on the global context of rice production; section 3 reviews the available literature, mainly on the number of farms, average farm size, and farmland distribution; section 4 describes and analyzes some productive and social variables of small-scale rice farmers in the Latin American context, in general, and of the three countries mentioned in particular; and section 5 offers the main conclusions.

Knowing how large this sector of the population is, as well as its socioeconomic conditions, is a requirement for the design and implementation, not only of any project or program whose objective is to improve such conditions, but also for the design of appropriate national and global policies by government institutions and decision-makers.

Moreover, among the relevant Sustainable Development Goals, target 2.3 envisions doubling, by 2030, "the agricultural productivity and incomes of small-scale food producers, in particular women, indigenous peoples, family farmers, pastoralists and fishers, including through secure and equal access to land, other productive resources and inputs, knowledge, financial services, markets and opportunities for value addition and non-farm employment" [7].

## II. Production And Consumption Of Rice In The Global Context

Data from the year 2018 on the relationship between land availability and global agriculture shows that, although the five largest countries by land area, in order of size, are the Russian Federation, followed by Canada, the United States, China (continental) and Brazil, these are not, in all cases, the countries with the largest extension of agricultural land: these are, firstly, China, followed by the United States, Australia, Brazil and Russia, all of them rice producers. However, despite having the largest amounts of land suitable for agricultural work, when ranked according to the proportion of cultivated land over the country total area, the United States would occupy the first place with 17,5% (Table No.1).

**Table No. 1** Top five countries regarding land surface, suitable for agriculture and cultivated (2019)

| | Land surface | Thousand ha | Land suitable for agriculture | Thousand ha | Cultivated land / national surface | % |
|---|---|---|---|---|---|---|
| 1 | Russia | 1.709.825 | China | 537.531 | EE. UU. | 17,5 |
| 2 | Canada | 987.975 | EE. UU. | 436.126 | China | 14,4 |
| 3 | EE. UU. | 983.151 | Australia | 361.205 | Brazil | 7,6 |
| 4 | China | 956.291 | Brazil | 241.337 | Russia | 7,5 |
| 5 | Brazil | 851.577 | Russia | 225.013 | Australia | 4,1 |

Source: Author's calculations based on FAOSTAT

However, when reviewing the number of cultivated hectares, this ranking changes again, and while Australia leaves the group, India enters straight to the first place with over 187 million hectares cultivated in 2018 (although it ranks eighth in total size), followed by the United States, China, Russia, and Brazil; this means that, in 2019, India cultivated 57% of its territory, compared to the 17,5% already mentioned in the United States. Likewise, the data on the areas cultivated in cereals puts China back in first place, excludes Brazil and includes Indonesia enters; and when we sort it by the number of hectares cultivated in rice, the USA and Russia leave the group, Bangladesh and Thailand enter, and India ranks first (Table No. 2).

**Table No. 2** Top five countries regarding Crops, Cereals and Rice areas (2019)

| | Crops área | Thousand ha | Cereals crops area | Thousand ha | Rice crops area | Thousand ha |
|---|---|---|---|---|---|---|
| 1 | India | 187.308 | China | 100.662.708 | India | 44.500.000 |
| 2 | EE. UU. | 172.445 | India | 98.008.000 | China | 30.189.450 |
| 3 | China | 137.419 | EE. UU. | 53.839.362 | Indonesia | 15.995.000 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 4 | Russia | 128.921 | Russia | 41.983.108 | Bangladesh | 11.910.361 |
| 5 | Brazil | 64.720 | Indonesia | 21.675.360 | Thailand | 10.407.272 |

Source: Author's calculations based on FAOSTAT

Despite the large figures of rice tons produced in 2018 and the number of hectares cultivated of this cereal, its production is strongly concentrated in China, which in 2019 produced 28%, and India, which produced 24%; they are followed far behind by Indonesia and Bangladesh, each with only 7,2% of global production. Additionally, both China and India are characterized by having a large number of small scale farmers who work on farms of less than five ha; while in Chinese cultivation small scale farmers prevail with a 'typical' farm size of around 0,1 ha [8] in India in the past decade the average size of farms was 1,2 ha [9].

Consumption figures are no less surprising: in 2018, Bangladesh was the largest rice consumer at 260 kg per person per year, followed by Laos (247 kg), Cambodia (240 kg) and Vietnam (206 kg). In fact, the ten largest rice consuming countries in the world are all Asian, with the exception of Guinea, and this African country ranks only eighth. When reviewing consumption by world regions, Asia ranks first, followed in order by the Caribbean, South America, Africa, Oceania, Central America, North America, and finally Europe.

Despite these massive figures, both of cultivated hectares as well as production and consumption [2] demonstrated that most of it is grown by small scale farmers; as part of the group of staple foods (such as rice, wheat, potatoes, corn, barley, rye, cassava, millet and peanuts), 82,3% of global rice is grown on farms of less than five ha, with 18,2% in plots between 2 and 5 ha and the remaining 64,1% in plots of less than 2 ha.

## III. Conceptual Framework

Available bibliography on small-scale farmers is extensive, and they have been analyzed from multiple perspectives; in the academic, institutional, operational analysis and "in the policy debate, the notion of 'small farms' goes hand-in-hand with the idea of disadvantage, risk of poverty, lack of opportunities, and need of support" [10] and there is abundant literature on this perception [11] [12] [13] [14 [15].

However, another recurring theme is the difficulty in defining with precision who can be considered a small-scale farmer and who cannot. This question becomes even more complex when using other expressions to refer to this sector of the population, as if they were synonyms; among the most common are family-based agriculture, peasant economy, smallholder agriculture, subsistence agriculture, and self-employed agriculture.

One of the biggest obstacles to proposing a quantifiable definition of small-scale farmers is that "small is a relative concept, depending on agro-ecological as well as socio-economic considerations. What is small in most countries in Latin America and the Caribbean is considered large in most countries in Sub-Saharan Africa or in Asia" [16] Even so, several analysts have made increasingly elaborate proposals to calculate how many rural producers can be considered small-scale farmers: at the continental level [17], at multinational level [18] [16] [2] [19], at the Latin American level [20] at the national level [21] [22], nationwide among rice growers [23] onso, 2020) and at the local level [24] [25] [26]. With a comprehensive sample of 111 countries and territories, it was calculated that "72% of the farms are smaller than 1 ha, 12% are between 1 and 2 ha and 10% are between 2 and 5 ha. Only 6% of the world's farms are larger than 5 ha" [16].

In addition to being associated with multiple variables, the concept of the small-scale farmer is dynamic insofar as it depends on access to land and other means of production and goes through adaptations and changes to produce and to adjust to new social, economic, political, and environmental scenarios that surround this population group. Hence, this concept is understood with different approaches, since this phenomenon is as heterogeneous as the peasantry itself and it is affirmed that each region and each culture has its own particularities [10].

In this article, referring to small-scale farmers implies at least the presence of the following four criteria, which collect the main parameters of the sampling frames with which the calculations were made: a) predominance of agricultural activity, carried out directly by the producer b) predominant use of family or community labor; meaning that the labor force employed in the productive unit must be provided by the home or the ethnic community to which it belongs; c) extension of land of the productive unit (generally less than 5 ha); and d) the producer and his/her family reside within a functional perimeter of the farm, or collective territory, from which their livelihoods are derived.

## IV. Latin America In The Global Context Of Rice Production

Because all Latin American countries are located between the Tropic of Cancer and the Tropic of Capricorn (with the exception of most of Uruguay, just over half of Argentina and Chile and a small part of Mexico), they count on average and throughout the year with temperatures between 20° C and 30° C, periods of abundant rainfall, and hot humid climates; however, the minimum temperatures can reach minus 0°C, with occasional frosts, and the maximum can reach around 40°C. Some countries also have other particular climatic characteristics, due, for example, to their heights above sea level, which allows them to have snow-capped peaks

all year round and at the same time tropical beaches and/or forests, deserts, meadows, savannas, mangroves and the great Amazon rainforest.

Latin America is the third region in the world in terms of rice consumption, because this cereal is part of the daily diet and the traditional gastronomy of its 641,934,046 inhabitants, who, distributed in their twenty countries, (according to the FAOSTAT classification) represent about 8% of the total world population.

Regarding the availability of land for its production, and as in the global case, there are important differences between the land area of the countries and the availability of land suitable for agriculture; the differences between the land suitable for agriculture and the percentages of cultivated land are even more noticeable as can be seen in Table No. 3, which shows the data for the six countries whose extension is more than 100 million ha. However, all Latin American countries cultivate rice and the number of hectares out of the total hectares cultivated in cereal is between 0.5% (Mexico) and 100% (Jamaica); while Brazil dedicates 8.7% of its surface in cereals to rice, Ecuador dedicates 43.3% and Colombia 60.6%. Of the 23 countries in the region, twelve dedicate between 20 and 100% of their cultivated area to rice in cereals and, of these, six dedicate more than 60% to it.

**Table No. 3** Top six Latin American countries regarding land surface, suitable for agriculture and cultivated (2018)

| | **Land surface** | **Thousand ha** | **Land suitable for agriculture** | **Thousand ha** | **Crops' area over land suitable for agriculture** | **%** |
|---|---|---|---|---|---|---|
| 1 | Brazil | 851.577 | Brazil | 241.334 | Brazil | 26,81 |
| 2 | Argentina | 278.040 | Argentina | 141.153 | Argentina | 27,07 |
| 3 | Mexico | 196.438 | Mexico | 108.021 | Mexico | 24,90 |
| 4 | Peru | 128.522 | Colombia | 50.993 | Colombia | 20,37 |
| 5 | Colombia | 114.175 | Bolivia | 38.264 | Paraguay | 19,99 |
| 6 | Bolivia | 109.858 | Peru | 23.699 | Peru | 12,53 |

Source: Author's calculations based on FAOSTAT

It should be noted that the differences in the figures between arable land and cultivated land are controversial because they are usually obtained from satellite information, which is why, for example, human settlements or nomadic production systems are sometimes unaccounted for. In addition, some of these figures lead to counting land whose current coverage is forests as land available for agriculture, which would be a great detriment to ecosystems. Various analyses warn against the false belief that the "underutilized" lands are in Latin America and Africa, when there are also in the US, in Russia and throughout Europe [27] [28]: "However, in general the analyzes and reports fail to point this out. After having introduced a series of more or less justified restrictive criteria, the authors of numerous reports present the phenomenon of uncultivated arable land as characteristic of developing countries, and developed countries disappear as if by magic from the list of countries involved " [28] In addition, the biogeographic advantages that countries close to the equator (that is, Latin American and some African and Asian countries) have contributes to the belief about the availability of land for agriculture.

From Table No. 3, the low percentages of cultivated land over the total land suitable for cultivation are also surprising, not only in these six countries but in all Latin American countries; this is mostly explained because lands suitable for agriculture are dedicated to livestock; Table No. 4, with our calculations with the 2018 FAOSTAT data, show that, if we take the cultivated area as one hundred percent, Uruguay is the country that uses the highest percentage of its land suitable for agriculture to pasture, and only four countries in the entire region (Dominican Republic, Guatemala, Cuba and Haiti) use less than half the area that they cultivate other products to cultivate pastures.

**Table No. 4** Latin American countries ranking regarding percentage of land suitable for agriculture devoted to grassland (2018)

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Uruguay | 89,5 | 6 | Perú | 79,6 | 11 | Panamá | 68,1 | 16 |
| 2 | Chile | 89,3 | 7 | Paraguay | 77,9 | 12 | Costa Rica | 67,3 | 17 |
| 3 | Bolivia | 87,5 | 8 | Argentina | 75,9 | 13 | Nicaragua | 64,7 | 18 |
| 4 | Venezuela | 84,7 | 9 | México | 75,1 | 14 | Ecuador | 56,8 | 19 |
| 5 | Colombia | 80,0 | 10 | Brasil | 73,2 | 15 | El Salvador | 56,5 | 20 |

Source: Author's calculations based on FAOSTAT

Regarding rice production, the group of six Latin American countries that dedicate a greater area of the national surface to it shows important differences (Table No. 5):

**Table No. 5** Top six Latin American countries regarding Crops, Cereals and Rice areas (2019)

| | Crops area | Thousand ha | Cereals crop área | Thousand ha | Rice crop área | Thousand ha |
|---|---|---|---|---|---|---|
| 1 | Brazil | 64.720 | Brazil | 21.446 | Brazil | 1.861 |
| 2 | Argentina | 40.900 | Argentina | 15.111 | Colombia | 527 |
| 3 | Mexico | 26.892 | Mexico | 9.426 | Peru | 438 |
| 4 | Colombia | 10.184 | Paraguay | 1.673 | Ecuador | 298 |
| 5 | Paraguay | 4.934 | Bolivia | 1.400 | Argentina | 198 |
| 6 | Peru | 4.832 | Peru | 1.243 | Rep. Dominicana | 193 |

Source: Author's calculations based on FAOSTAT

Table No. 6 also shows that while the Dominican Republic is the country that dedicates the largest area of cultivation of its total extension to it (but it is the third country with the smallest land area in the entire region) in Colombia, rice occupies the second largest area, after coffee, as in Peru, after cocoa, and in Ecuador, rice occupies the third largest area, after cocoa and corn. In Brazil and Argentina, the situation is different because rice occupies an area twenty-one times and ninety times smaller, respectively, than soybeans, which in the two countries is the crop to which they currently dedicate the largest number of ha. At present the six largest rice producers in Latin America, in order, are Brazil, Peru, Colombia, Uruguay, Argentina and Ecuador.

**Table No. 6** Top six Latin American countries regarding Rice area, production and yield (2019)

| | Rice crop area* | Ranking | Milled Rice Production | Thousand Tons. | Rice Yield | Tons/ha |
|---|---|---|---|---|---|---|
| 1 | Rep. Dominicana | First | Brazil | 6.916 | Uruguay | 8,5 |
| 2 | Peru | Second | Peru | 2.127 | Peru | 8,1 |
| 3 | Colombia | Second | Colombia | 2.009 | Argentina | 6,9 |
| 4 | Ecuador | Third | Uruguay | 800 | Chile | 6,5 |
| 5 | Brazil | Seventh | Argentina | 794 | El Salvador | 6,4 |
| 6 | Argentina | Thirteenth | Ecuador | 733 | Brazil | 6,3 |

*Rice crop area compared with all crop areas

Source: Author's calculations based on FAOSTAT

An analysis of some characteristics of the farms and of the small-scale farmers producing rice in Latin America, in general, and in greater depth in Brazil, Colombia and Ecuador is offered below, since despite the differences between them (e.g., their size, access and use of land, land Gini and the area dedicated to rice, among several others), they also share common characteristics.

### *4.1 General land use*

In Brazil, by far the largest country in the region, just over 10% (35.881.447 ha) of the total 351.289.816 ha at the national level are cultivated in soybeans, their product with the greatest extension, obtaining 114.269.392 tons. Although rice is not the main agricultural product in Brazil, it is the country that cultivates the largest crop area (1.710.049 ha), producing 10.368.611 tons and grown practically throughout its territory [6]. And according to the 2017 Agricultural Census, 77% of the total of the 3,9 million registered productive units correspond to small-scale farmers, which occupy 23% of the total area of the productive units [5].

In 2019 in Colombia (a medium-sized country), of the almost 51 million hectares of land suitable for agriculture, 853.755 were cultivated in coffee (1,7%), its main export product with 885.120 tons produced, and the second largest extension was dedicated to rice, which with its 531.158 ha cultivated (1,1%), produced 3.012.311 tons [6]. With data from the National Agricultural Census (2014), the National Department of Statistics found that "of the total agricultural land, 0,4% of the properties are larger than 500 hectares and occupy 75,7% of the dispersed rural area registered, while 73,2% of properties have less than 5 hectares and occupy 2,3% of the rural area" [29].

In Ecuador (one of the smallest countries in the region), producers have 5,11 million hectares nationwide; of these 525.435 ha (10,3%) are grown in cocoa, 322.846 ha in corn (6,3%) and 257.273 ha (5%) in rice, their three main products, from which they obtain 283.680 tons, 1.479.770 ton and 1.099.686 ton respectively [6]. Our calculations with data from the Continuous Agricultural Surface and Production Survey (ESPAC) carried out by the National Institute of Statistics and Censuses of Ecuador in 2018, show that 67% of all registered farms have 2 ha or less, and if we add to this group those properties of 5 ha or less, the figure reaches 78,7% [3].

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***4.2 The size of the Rice Production Units (hereinafter UPA, for its acronym in Spanish)***

UPA registered in Brazil were 179.881, and its highest production is traditionally found in five states in which 10.409.832 tons were produced: Rio Grande do Sul with 80,8% of total production, Santa Catarina (8,5%), Tocantins (4,7%), Mato Grosso (4%) and Maranhão (1,2%); however, when relating the data on the extension of land cultivated in rice with the number of UPA in which it is cultivated, it was found that there are large differences between them, according to the average extension of the UPA, because while an estimate shows that in Rio Grande do Sul and Mato Grosso the average size of the UPA is 116 ha, in Maranhão it is 1 ha [5].

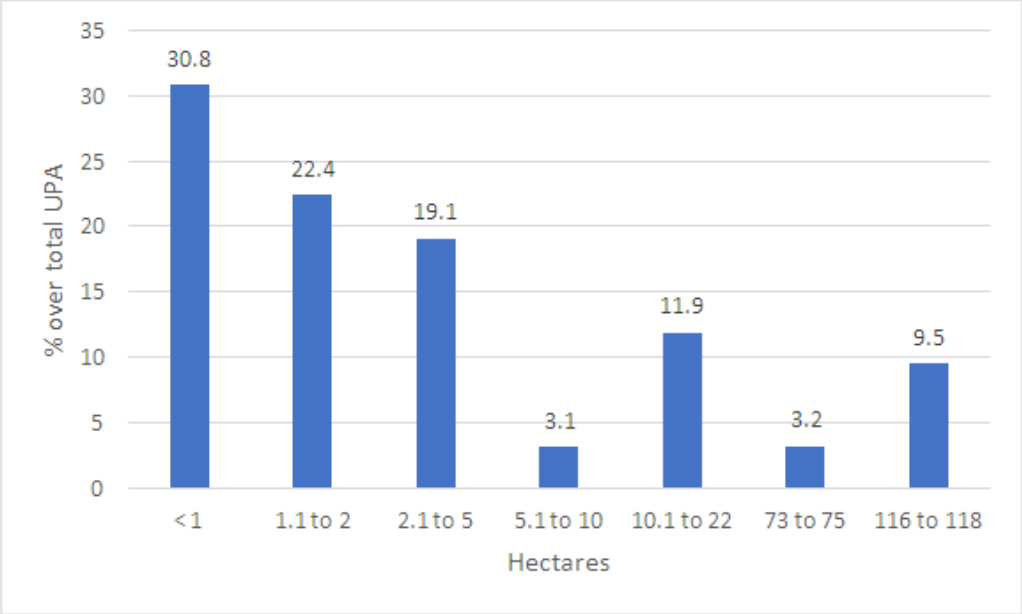
As in Brazil, the production of rice in Colombia has a wide extension in terms of area since it is cultivated in 23 of the 32 departments in which it is administratively divided and is mainly concentrated in the departments of Córdoba, Antioquia and Tolima, and especially Chocó, in which 27,6% of the 13.813 small scale farmers identified are found. In relation to the amount of land that rice growers have in Colombia, and according to the 2016 Rice Census (which only included producers affiliated with the National Federation of Rice Growers - FEDEARROZ), 16.378 producers located in 25.256 farms produced 2.599.268 ton. of rice [29]. However, our calculations with the 2014 National Agricultural Census show that there are actually 41.963 rice producers, whether affiliated with FEDEARROZ or not, and of these, 32,9% (13.813 UPA) are small scale farmers [23].

In the case of Ecuador, and as in Brazil and Colombia, rice is also grown in much of the national territory. However, it is concentrated in certain regions of the country such as the province of Guayas, which produces 78% of the national rice on farms where 20% have less than 1 ha and 51;5% have between 50 and 100 ha; It is also cultivated in the province of Los Ríos, where 17,4% of Ecuadorian rice is produced, on farms where 14% have less than 1 ha and 45,8% have between 50 and 100 ha [3].

***4.3 Hectares of cultivated rice, No. UPA rice, and estimated size***

By grouping the differences in the average size of the UPAs that exist in the 27 states of Brazil and one Federal District, we obtained the seven categories that are observed in the following figure (No. 1):

**Figure No. 1** UPAs' average size estimation in Brazil (% - 2017)



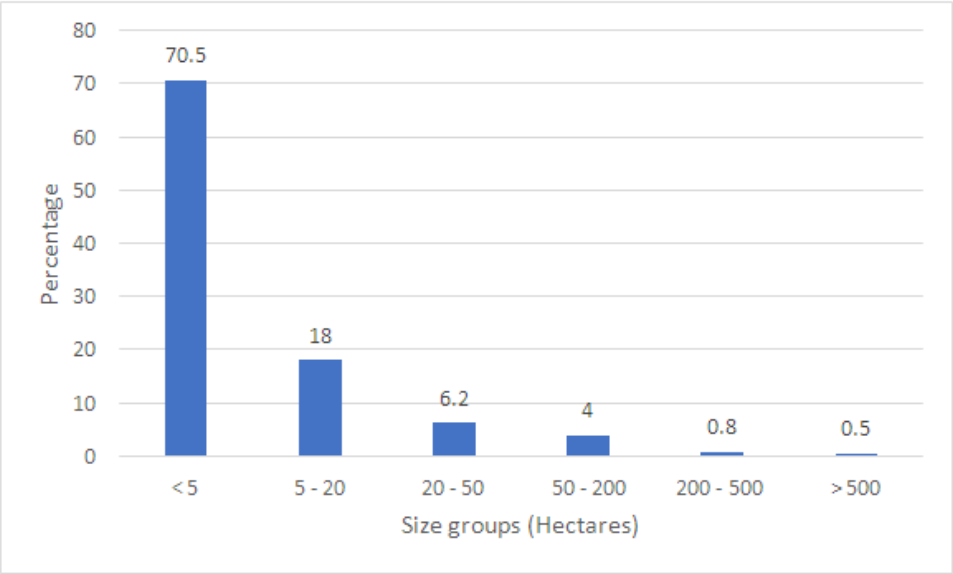

Source: Author's calculations based on Censo-Agro IBGE

It is in two states, Rio Grande do Sul and Mato Grosso, where there are UPA whose extension is on average between 116 and 118 ha; the UPAs with properties between 73 and 75 ha are located in two other states,

Mato Grosso do Sul and Rondônia; the UPAs with an average size between 11 and 22 ha are in five states, farms between 5 and 10 ha in two other states, farms between 2 and 5 ha in four states, farms between 1 and 2 ha in four other states; and with plots of less than 1 ha, in the remaining eight states. This unequal distribution, in terms of the number of UPAs and their size, is also reflected in Figure 1, which also highlights not only the large gaps that exist between the sizes of the UPA, but also shows how much of the total of 5.073.524 million UPA, 3.663.936 (72,2%) have 5 ha or less, and 53,8% have 2 ha or less.

In Colombia, the also very unequal percentages of land available to agricultural producers in general and by farm size are shown in the following figure (No. 2).

**Figure No 2** Rural land size distribution in Colombia (% - 2014)

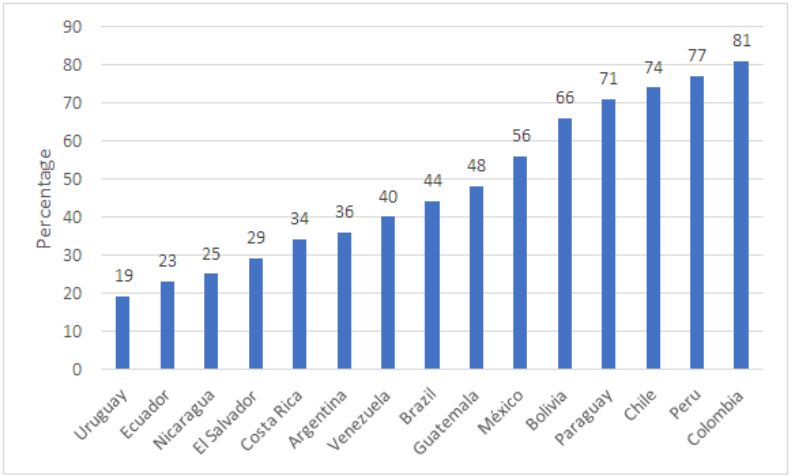



Source: (OXFAM, 2017: 10)

When comparing these figures with the estimates of Lowder et al [16] in which 52;8% was calculated for farms with 5 ha or less, the growth of the small-scale farmer sector and the advance of land concentration during the last decades of the Colombian armed conflict is confirmed, in which It is known as the agrarian counter-reform (30) [31].

While it is said that Latin America is not the poorest region in the world but it is the most unequal [32], it is also stated that Colombia is the most unequal country in the region. In fact, this historical inequity was one of the main reasons for the origins of the armed conflict in Colombia in the middle of the last century and on which a solution was agreed in the very first point of the Peace Agreements, signed in 2016, which has not yet show progress (Figure No 3).

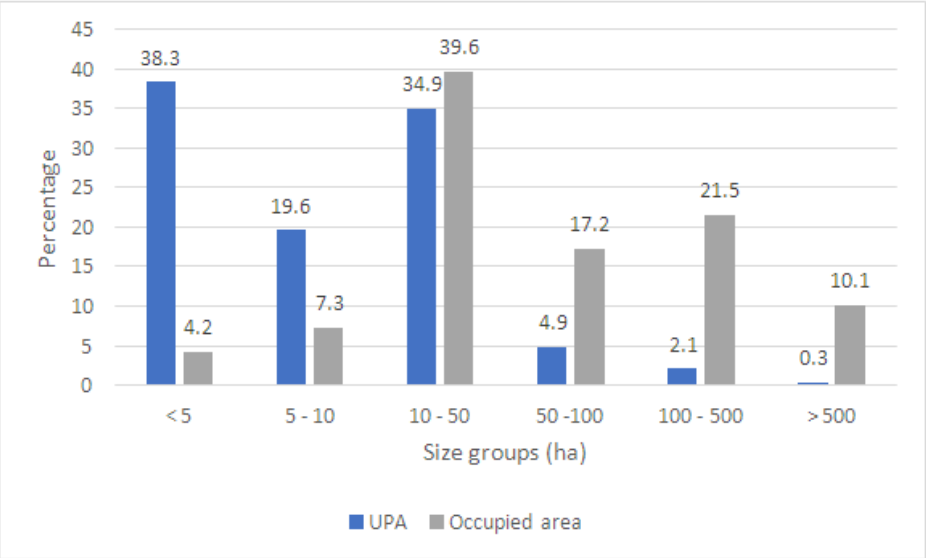
**Figure No 3** Land percentage belonging to largest 1% plots of land




Source: OXFAM (2017)

The distribution of land among rice producers by the size of their farms, is shown in the following figure (No. 4). While the presence of UPAs of 5 ha or less reaches 38,3%, they occupy only 4,2% of the total area planted in rice nationwide.

**Figure No 4** Land distribution among rice growers in Colombia (% - 2014)

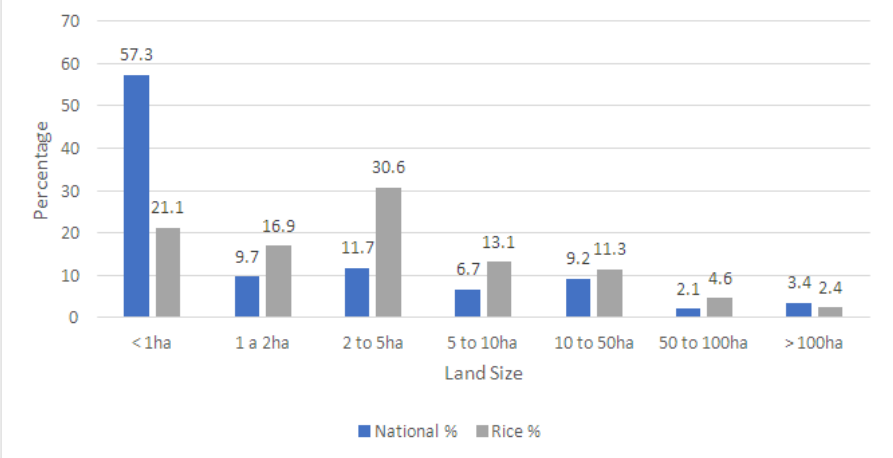



Source: Alonso (2020)

At this point it is necessary to clarify that, due to the difference in the quality of soils in the national territory and other biophysical characteristics, Colombia has designed the Family Agricultural Unit (UAF for its acronym in Spanish), defined in article 38 of Law 160 of 1994 as a measure of land extension, calculated for each of the 1103 municipalities that it currently has. This measure establishes how many hectares a family of small-scale farmers requires, as a minimum, to reach the necessary income and achieve its sustainability through the exploitation of a portion of land. The figures in terms of the UAF, also confirm the inequity of the land distribution, since of the 13.813 small scale farmers that grow rice, 12.250 (93,7%) have an area less than the UAF and only 863 (6,3%) had 1 UAF [23].

In Ecuador, the number of farms of 1 ha or less in which rice is grown is significant (21,1%), and if we include farms of up to 2 ha, there are 38%, and up to 5 ha they represent in 68,6% in total. The rise in rice farms from 2 to 5 ha stands out, which almost triples the percentage of farms of this extension nationwide. The following graph shows the distribution when comparing the extension of the farms at the national level with those of rice (Figure No. 5). This fact shows that the distribution of the Ecuadorian land in the case of rice is different from that of Brazil, since, although the farms of 5 ha or less represent 62,6%, it is highlighted that the farms of between 5 and 10 ha and between 10 and 50 ha represent 13,1% and 11,3% respectively.

**Figure No 5** Size of land distribution at national level and rice crops in Ecuador (% - 2019)



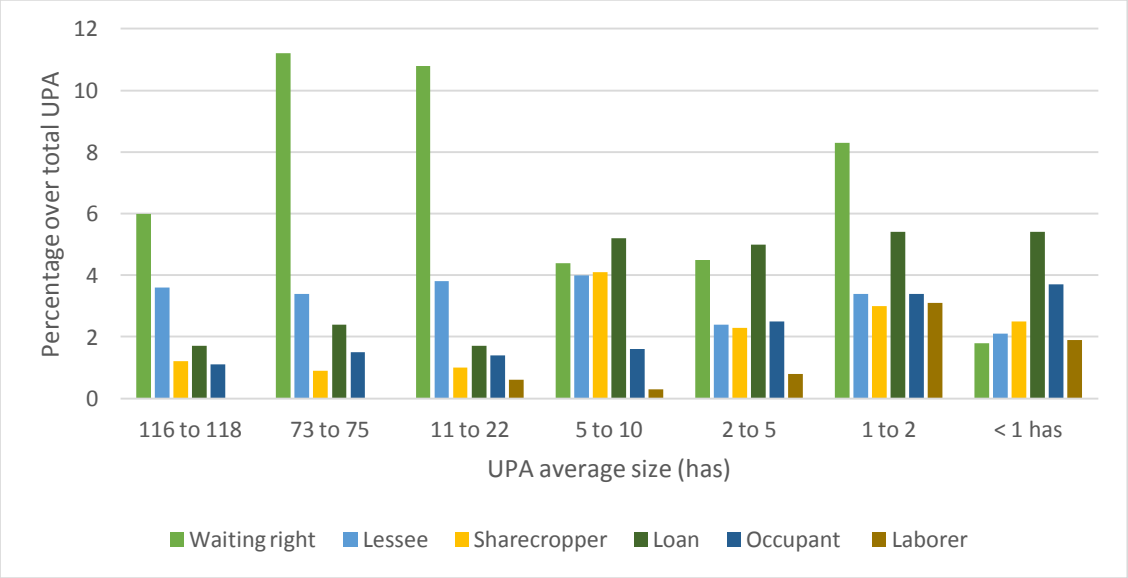

Source: Author's calculations based on INEC (2019)

However, on a national scale there is inequality like that of Brazil and Colombia; in fact, referring to the concentration of land in Ecuador, it is stated: "Sixty years after the first agrarian reform, small peasants continue to control almost the same area of land: 6,7% in 1954 compared to 6,5 in 2013; the Gini coefficient varied very little: in 1954 it was 0.87, for 2013 it registered 0.76. That is to say, the redistribution was mainly due to the fragmentation of large property towards productive units of intermediate size (between 20 and less than 100 ha), while in 1954 the medium property controlled 17,8% of the national surface, as of 2013, it controls 43,2%" [33].

### *4.4 Land ownership of rice UPA*

Data from Brazil on the legal situation around property ownership show high percentages of legal ownership in all UPA sizes; in the states where the UPA is larger, 86,3% represent the legal owners; in those states whose average size is 73 ha, 80,6%; in those with 17 ha, 80,7% ; in those with 5 ha, 81,8%, and these percentages decrease in states with the smallest average UPA sizes; in those of 2 ha, 73,4% are legal owners and in those whose average extension is 0,8 ha, legal ownership reaches 72,5% [5]. The decrease in legal ownership of land in states whose UPAs have the smallest sizes is explained by the greater presence of other forms of land tenure other than legal ownership; the following graph (No. 6) shows this information.

**Figure No. 6** Land Property Status by Average UPA Size (2017)




Source: Authors' calculations based on Censo-Agro IBGE

In this figure it should be noted too, that in all cases there is a significant percentage of producers who are waiting for legal titles on the rice producing units, but still work on them even without property titles. Although there is a presence of administrators who are not the owners (but tenants or renters) in the larger properties, the sharecropping percentages increase as the property is smaller. A similar situation exists with laborers (or landless workers), who have no presence whatsoever on farms larger than 70 ha, that is, there are no landless workers, managing or leading the agricultural activities of the rice producing units in the large UPA, while their presence increases in the smallest properties.

The states whose UPA size is larger (greater than 10 ha) are administered by a consortium, organization or group of some kind in 30,6% of the cases, while 65,5% is administered by an individual, who in 86% of cases is the owner. This may be one of the reasons why these UPA are in the process of obtaining their title to the property. And, as expected, as the size of the properties decreases, so does the presence of consortia and/or groups that administer the activities, and the administration remains in the hands of an individual, who, as we have already seen, may belong to some of the categories of land tenure other than that of owner.

The fact that there is a foreman or manager generally implies that the property owner is a person who can live in the city and is engaged in other tasks that are or not related to agricultural production, or also because the property owners have other units of agricultural production demanding for time or specific knowledge and require additional personnel who are delegated to the foreman. In addition, the presence of a foreman implies the generation of one or more jobs, since the foreman may also employ other people, but from the foreman point of view, it means that he (only very exceptionally women are hired as 'foremen') does not own their own land and does not have a property to produce.

This fact is also important to the extent that they do not spending a significant amount of time away from the farm making money, and usually are not engaged in the market economy, neither in the formal nor in the informal sector, which count as indicators to be categorized as peasants and not farmers, as they effectively define themselves.

The predominant forms of land tenure in Colombia also show that they were individual property (72,7%), rent (9,6%) and collective property (5,1%) [4]. In the case of rice producers, they were mainly individual property, collective property, and rent, with percentages of 69,1%, 16,6% and 3,3%, respectively. The importance of collective property could be explained by the participation of indigenous and Afro-descendant communities in rice production, with different arrangements regarding land ownership, for example, with lands that are owned collectively [23].

According to ESPAC data [3], in Ecuador 89,9% of rural producers own their land, 3,9% is in the process of legalizing inheritance, 2,5% is in the hands of producers who rent it to work on it, while the remaining 3,7% is distributed in various other forms of land tenure, such as communal (mostly in indigenous territories), in litigation, or land occupied illegally. In the case of rice producers, the percentages differ somewhat, because while the producers who own their land are 89,1%, they are followed by those who lease the land to produce (5,2%) and those who are in the process of inheriting (5%). In the remaining percentage there are no communal lands, nor invaded.

### *4.5 Yield*

Regarding the yield of rice crops, globally, the countries that obtain the maximum achieve over 8 tons/ha, for example Australia (8,7) and Tajikistan (8,5), while the minimum countries obtain on average is just over 4 tons per ha. Among the Latin American countries, the one that obtained the highest yield in 2019 was Uruguay (8,3 ton/ha) while Haiti obtained the lowest yield (2,7 ton/ha). Data from Brazil show that its average yield at the national level is just over 6 tons/ha [6]; the two states whose farms have on average the largest extensions (Rio Grande do Sul and Mato Grosso) produced 79,9% of the national production, and the states whose farms have on average the smallest extensions produced merely 0,2% [5].

Yield among Ecuadorian rice growers is on average 4,3 ton/ha [6]; the distribution of production among Ecuadorian small-scale rice farmers shows that those with less than 5 ha produced 16,7% of the total production, those producers with between 5 to 10 ha produced 13,5%, those with between 10 to 50 ha produced 31,4% ,and finally, producers with more than 50 ha produced 38,4% according to ESPAC [3].

This uneven distribution of production is to be expected because the main causes of rural poverty, including predominantly low access to land (and good quality land), have a direct negative effect on the yield obtained from the products cultivated, to the extent that the lack of agricultural inputs is not limited only to the land; this also derives from falling into inappropriate cultivation systems, as well as inappropriate crop management, due to the economic impossibility of accessing equipment and machinery, or the biophysical impossibility of using them, inadequate management of natural risks, such as floods and droughts, and climate variability, which also leads to poor market access for the products obtained.

The following table (No. 7) shows the average yield of small-scale rice growers in Colombia, which was 3,7 ton/ha, that is, lower than the national average, which reached 4,5 ton/ha in 2014 [23].

**Table No. 7** Area sown, area harvested, quantity obtained and yield of rice cultivation in Colombia (small-scale farmers and national level)

| | **Small-scale total producers** | **National total** |
|---|---|---|
| Number of productive units | 13.813 | 41.963 |
| Sown area (ha) | 46.903 | 515.871 |
| Harvested area (ha) | 39.304 | 473.166 |
| Production (tons) | 157.446 | 2.425.573 |
| Yield (ton/ha) | 3,7 | 4,54 |

Source: Alonso (2020: 52) [23]

However, this average of 3,7 ton/ha hides two groups of producers, one with yields between 1 to 2,9 ton/ha and the other between 4 and 6,9 ton/ha, which represent 50,6% and 47,3%, respectively. These differences within Colombian small-scale farmers are mainly due to two forms of rice production, common in Latin America: one is manual, in which dry rice varieties are sown with lower productivity, and the other is mechanized, which can be cultivated with irrigated or rainfed rice varieties, which have higher yields, but which implies having better biophysical and economic conditions for production, for example, irrigation systems. In fact, statistical calculations in this regard showed 51,9% of UPA working with manual rice and 48,1% with mechanized work, corroborating yield data.

In addition to this, when the averages are analyzed in greater depth, the regression calculations between farm size and productivity for the agricultural products with the highest participation in agricultural production in Colombia, including rice, corroborate these results: rice obtained -0.277, indicating that the larger the farm, the lower the productivity [34]. Further, "as less than 2% of agricultural land in Latin America is found in these smallholder units, that proportion of production represents greater productivity per hectare than is found in areas characterized by larger farms" [2]. This is not only seen in Latin America, but worldwide [1] [16] [2].

The popular saying of "neither too much nor too little", in terms of the plot size, applies to this case, because if the farms where rice is produced are very small, as in the case of most small-scale farmers in Latin America, it is not possible to mechanize production, among other negative effects, leading to low yields; but, on the other hand, the production systems used in large farms in Latin America do not obtain the expected yield from producers who have the socioeconomic conditions to obtain them.

### *4.6 Rice farmers' access to equipment and machinery*

Access to agricultural equipment and machinery in the case of Brazil shows high percentages in all cases, since in the smaller UPAs (10 ha or less), in which less access to it would be expected, 70% use tractors, 14 % use seeders, and 6% combine harvesters; however, the reason for these high percentages may be due to the fact that the census did not ask about the ownership of machinery and equipment, but rather about the use of them [5].

Ecuadorian rice producers, as expected, have differential access to the use of machinery according to the size of their farms: while 31% of those who work on farms of less than five hectares use a tractor, 66,4% of those with properties larger than 10 ha also use it; it is important to keep in mind that, as in the case of Brazil, the surveys in Ecuador do not ask about the ownership of machinery and equipment, but about the use of it [3].

Regarding property of equipment and machinery for agricultural use in Colombia, while the previous Census indicated that only 16% of Colombian farmers had access to machinery (FINAGRO, n.d.), current data reveals 85,7% of small scale farmers reported owning only one or two implements, the most frequent being a motor scythe (23,5%), a chainsaw (17%) and a wooden boat with a rod or oar (8,5%) [23].

### *4.7 Employment generation in the small- scale rice producers*

77% --that is, about 3,9 million UPAs in Brazil-- were classified as family farming, producing over an area of 80,9 million ha, that is, 23% of the area of all UPAs in the country, and generating employment for 67% (10,1 million people) of all personnel dedicated to agricultural work in the country; additionally, it generates 23% of the Brazilian agricultural production [5].

On the other hand, the Colombian Minister of Agriculture and Rural Development (2017 - 2018), stated that the quarter from November 2017 to January 2018, was "the fifth consecutive quarter in which agriculture is the branch that most generates new employment, in comparison with the other branches of activity" [35]. According to this same source, DANE figures indicate that out of 22,3 million people in Colombia who work, 4,9 million people are employed in agricultural activities, and that the branch that had the highest growth in job creation was agriculture, livestock, hunting, forestry, and fishing with 7,9% variation, which represented 278.000 new jobs in 2017.

Small scale farmers in Ecuador contribute at least a fifth of the production of goods and services at the national level, since they produce 95% of the foodstuffs consumed internally; Furthermore, they represent 62% of the economically active rural population and most of them generate their own employment [33]. Table No. 8 shows the results when calculating the different types of employment generated by agricultural producers in Ecuador.

**Table No. 8** Employee type hired by farms size in Ecuador (2019)

| | **Employee type** | | | | | |
|---|---|---|---|---|---|---|
| **Crops size** | **Producer Relatives** | | **Permanent payment** | | **Occasional Payment** | |
| | **Men** | **Women** | **Men** | **Women** | **Men** | **Women** |
| 1 ha or less | 19,9 | 30,7 | 4,1 | 3,4 | 7,8 | 21,7 |
| 1,1 to 2 ha | 10,8 | 13,5 | 3 | 4,1 | 6,4 | 10,3 |
| 2,1 to 5 ha | 17,7 | 18,7 | 6 | 6,9 | 12,7 | 12,1 |
| 5,1 to 10 ha | 12,7 | 11,7 | 7,1 | 7,6 | 11,3 | 8,4 |
| 10,1 to 50 ha | 23,3 | 18,1 | 25,2 | 25,7 | 28,3 | 20,7 |
| 50,1 to 100 ha | 6,3 | 3,8 | 14 | 13,9 | 11,7 | 9,3 |
| 100 ha and more | 9,2 | 3,4 | 40,5 | 38,4 | 21,8 | 17,5 |

Source: Author's calculations based on ESPAC, INEC

From this table we can see the significant percentages of family members employed in small farms with an area of up to 50 ha, in which 84,4% of men and 97,7 of women family members of the producer are hired; the opposite situation occurs when it comes to (non-family) employees with permanent pay, who are concentrated in the largest farms, that is, 50 ha and more, in which 79,7% of men are employed and 78% of women. It is also observed that, according to the survey data, similar numbers of men and women are employed.

***4.8 Gender and education of small rice farmers***

According to the tradition in Latin America, the vast majority of the owners of rural properties in general, including those where rice is grown, are men; regardless of whether the properties are large or small, the percentages in which men are owners in Brazil reaches 81%, in Colombia male owners are 76%, and in Ecuador the trend is confirmed with 75% of rural land in the hands of men. In Colombia, moreover, "the decisions in agricultural production units are made by men for the most part. However, 78% of the women who make decisions about their land have less than 5 ha" [36]. In Ecuador, merely 25% of rural land is in the hands of women [3].

In relation to the age of rural landowners in Brazil, both men and women are concentrated in the range of 45 to 54 years (24,2%) and when we add those who are between 35 and 64 years old, they represent 65,7%. Rice producers show a similar situation: the highest percentage (22,7%) is between 45 and 54 years old, and when we add those who are between 35 and 64 years old, they reach 62,6%. The figures for Colombian rice producers also confirm the distribution trend by national age: the age range between 40 and 54 years concentrated the highest number (32,4%) and this same range also concentrated the highest percentage of male producers (32,4%) while the age range with the highest number of women was 35 to 49 years (33,4%). In the case of Ecuador, the available databases do not have information on the social characteristics of the producers.

Another characteristic of rural producers in Brazil is that 15,5% cannot read or write, and the majority (23,8%) have only accessed the old cycle of primary education or only the current regular elementary school (19,1%). According to the 2014 National Agricultural Census data in the Colombian rural sector the illiteracy rate corresponds to 12,6% [23]. The next and last section presents the main conclusions.

## V. Conclusions

Despite the enormous difficulties that they must face on a daily basis, the importance of small-scale farmers is undeniable, since not only do they represent more than 80% of the total agricultural production units in Latin America and the Caribbean, but also 27-67% of food production comes from this sector and also generates between 57 and 77% of agricultural employment. On the other hand, in terms of both production and consumption, rice is a primary food in the daily diet of Latin Americans and, in the same way, small-scale farmers who participate in the production of this cereal are very important.

Although the three countries analyzed differ in size, in their biophysical conditions, in prioritized agricultural products, and in land concentration measurements, they show great similarities in the characteristics of the small-scale rice farmers analyzed, which seems to confirm a trend in this sector of the population. Of all the variables analyzed, the most worrying one, and from which the others are largely derived, is inequitable access to land. It can be observed that despite the fact that small-scale farmers represent the highest proportion among agricultural producers at the national level, they are also the ones who have access to the smallest extension of land to carry out their work.

At the global level, the Gini index of land concentration by regions indicates that Africa is the continent with the lowest concentration of land with 0.53 and is followed in order by Asia (0.56), Europe (0.58), North America (0.69), Oceania (0.70) and finally Latin America and the Caribbean which reaches 0.7 [37]. And although this indicator has its inaccuracies (e.g., land quality and land use are not included), the figures in Latin America in general are alarming, such as those shown in the following table (No. 9).

**Table No. 9** Land concentration in some Latin American countries

| | **Owners %** | | **Land %** | |
|---|---|---|---|---|
| Argentina | 0,9 | of the owners of the very large land plots control | 34 | of the country's agricultural land |
| Brazil | 1 | of the owners of the very large land plots control | 50 | of the country's agricultural land |
| Costa Rica | 4,8 | of owners with more than 100 ha plots control | 60 | of the country's agricultural land |
| Guatemala | 8 | are owners of | 80 | of the country's agricultural land |
| México | 1 | of the owners of the very large land plots control | 56 | of the country's agricultural land |
| Paraguay | 1,6 | are owners of | 80 | of the country's agricultural land |
| Uruguay | 90 | forestry companies own 5,700,000 ha, that is, | 41 | of the country's agricultural land |

| | | | | |
|---|---|---|---|---|
| | | | | excluding mining companies |

Sources: Argentina [38; Brasil [39]; Costa Rica [40]; Guatemala y Paraguay [37]; México [41]; y Uruguay [42]

Additionally, and according to these same sources, in the case of Argentina the owners of large agricultural holdings have on average more than 2.000 hectares and the average of the farms in the top 1% of the large ones have more than 22.000 hectares; in Brazil, properties with areas smaller than 10 hectares represent half of rural properties, but they control only 2% of the total area; in Costa Rica, 61,4% of farms smaller than 10 hectares cover barely 7,5% of the land and in Nicaragua the inequality in the distribution of land at the national level shows an increase in the Gini coefficient of land that reached 0,78 in 2011 (Ruiz & Lopez, 2017). In the case of Guatemala, it is estimated that half a million rural families do not own land [36].

On the other hand, the analyses and data confirm the statement that "in all areas, women are always the most excluded. It does not matter if you look within each quintile or decile; It does not matter if you check the list of the richest 1% or that of the 101 richest people in Latin America; it does not matter whether it is measured within the urban or rural population" [36].

It is unexpected to know that a union organization such as FEDEARROZ, with an important presence in the agricultural field in Colombia and Latin America, has worked with a statistical universe of 25,256 rice producers in its most recent census [29], while the figures from the Agriculture National Census (2014) show that there are actually 41,963 rice producers; that is, they exclude 40% of existing producers, most likely small scale farmers, who precisely due to their socio-economic conditions cannot carry out mechanized productive activities.

Although it exceeds the purpose of this article, it is important to note that to complete their domestic supply of rice, all Latin American countries with the exception of Argentina, Paraguay and Uruguay import it, usually against the will of national producers, who, without a doubt, could benefit from more governmental support for national production; this topic certainly opens more windows for research.

To the extent that the leading role of small-scale farmers in food production, in many cases through sustainable production practices, is undeniable, seeking their continued presence requires focusing on their economic and environmental sustainability and on a regime of democratic politics in which their proposals must be debated and incorporated.

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