

## Original Research Article

Formatted: English (United States)

### Socio-Economic Status of Wheat Growers in Some Selected Areas of Bangladesh

**Aims:**The study was carried out to determine the socioeconomic status of wheat farmers in Bangladesh.

**Study design:**Simple random sampling technique was used for the study.

**Place and Duration of the Study:** Birganj Upazila under Dinajpur and Thakurgaon sadar, and Pirganj Upazila under Thakurgaon ~~district~~ district were purposively selected for the study. The survey was conducted from February to March 2019.

**Methodology:**A total of 150 wheat growers were selected as sample farmers. Data were collected from the respondents through direct interviews using pre-tested interview ~~schedules~~ schedules. Descriptive statistics such as mean, frequency, and percentage were employed to ~~analyse~~ analyze ~~the data~~ the data.

**Results:** The study estimated that the average farm size was 1.38 ha, and most of them were medium farmers (40 percent). Most of the wheat growers were middle-aged (51–60 years old), while a small portion of them were younger (18–30 years). Findings revealed that about 35.3 percent of farmers were literate, while 34.7 percent completed secondary education. The average family size was 4.96 persons. However, the large farm household had relatively more family members than other farm households. Most of the respondents had more than 30 years of farming experience. Nevertheless, agriculture, notably wheat farming, was their primary occupation (92 percent), and about 70.67 percent of their average yearly income came from agriculture. Furthermore, the study found that only a small percentage of farmers obtained training from the government's agricultural extension office, while most farmers did not receive any training opportunities. In this study, about 53.33% of respondents received loans from banks or NGOs, whereas around 46.67% received no credit.

**Conclusion:**Therefore, the government should provide more institutional and infrastructure support to promote wheat production, which will increase efficiency, income and enhance the livelihood conditions of wheat farmers in the study areas.

#### ABSTRACT

Formatted: English (United States)

**Keywords:** ~~Keywords:~~ Socio-economic status, Wheat growers, Bangladesh.

Formatted: English (United States)

#### 1. INTRODUCTION

Formatted: List Paragraph, Numbered + Level: 1 + Numbering Style: 1, 2, 3, ... + Start at: 1 + Alignment: Left + Aligned at: 0.25" + Indent at: 0.5"

Wheat has a significant importance in Bangladesh's economy in terms of production, food security, and employment generation. About 80 % of people in Bangladesh depend directly on agriculture for their food and livelihood, with wheat being the second most important crop after rice [1]. ~~Wheat's~~ Wheat's gross cultivated area was 0.328 million ha, and the production was 1.08 million MT in 2021 [2]. In every year Bangladesh needs to import large amounts s of wheat grains to meet up the domestic demand. In 2022, the country's annual wheat demand stands at 7.5 million ~~tonnestons~~ tonnestons, of which 1.1 million ~~tonnestons~~ tonnestons are produced locally and the remaining 6.4 million ~~tonnestons~~ tonnestons are imported [3]. Wheat consumption in this country has increased dramatically during the last decade. It can be linked to the country's rising population and changes in consumption habits. Even though existing wheat varieties in Bangladesh are high yielding, production did not keep pace with the increasing population.

Formatted: English (United States)

Formatted: English (United States)

Formatted: English (United States)

Formatted: English (United States)

Formatted: English (United States)

Formatted: English (United States)

Formatted: English (United States)

The wheat sector in Bangladesh has witnessed numerous notable changes during the last few decades in terms of production. Farmers switching to other crop cultivations, unfavorable weather conditions, and natural calamities etc., all had an impact on wheat yield in the recent years. Farmers are increasingly choosing alternative food crops over wheat due to various reasons. They are shifting their focus to crops with higher financial returns, such as potatoes, vegetables, and Boro rice [4]. Another major issue is that climate change, particularly drought, is limiting wheat production in the northwest region, which accounts for around 68.3% of the country's total wheat acreage [5]. Moreover, ~~the~~ Wheat blast is one of the most damaging wheat diseases, also discouraging farmers from continuing to grow wheat. Though the disease's severity has decreased significantly in ~~the~~ recent years, farmers are still concerned [6]. Therefore, due to various reasons, wheat acreage is decreasing from the previous years, resulting ~~in~~ lower production. Given this backdrop, it is very important to encourage wheat ~~farmers~~ ~~farmer~~sto continue and ~~increase~~ ~~increase~~ their wheat farming operations. It is also critical to take the required steps to increase wheat profitability and ~~farmer's~~ ~~farmer~~efficiency. To accomplish so, it is necessary to understand the current ~~socio-economic~~ ~~socioeconomic~~ state of wheat growers in Bangladesh. Farmers' socioeconomic traits have an impact on farm planning and ~~decision making~~ ~~decision-making~~. Socioeconomic factors have previously been shown to influence production practices [7]. Land holdings, age, education level, occupation, cultivation experience, farm size, access to credit and training, and other socioeconomic factors of respondents are likely to influence farmers' decision-making ability and production [8,9] These are the most essential factors for determining the socioeconomic status of the farm households. Therefore, this ~~this~~ study attempted to assess the socioeconomic status of wheat growers in some selected districts of ~~Bangladesh~~ ~~Bangladesh~~ with a focus on various socioeconomic factors such as average farm size, age, educational profile, income, farming experience, family size, occupational status, training facilities, and access to institutional credit, etc. It will provide a comprehensive view of farmers' socioeconomic position, which will allow researchers and policymakers to propose strategies to increase their production ~~efficiency~~ ~~efficiency~~and income and thus improve their livelihood.

Formatted: English (United States)

Formatted: English (United States)

Formatted: English (United States)

Formatted: English (United States)

Formatted: English (United States)

Formatted: English (United States)

Formatted: English (United States)

Formatted: English (United States)

Formatted: English (United States)

Formatted: English (United States)

## 2. MATERIAL AND METHODS

Wheat is grown in different parts of the country however northwest region occupies around 226,956 ha approximately 68.3% of ~~the~~ total wheat area [5]. Therefore, Dinajpur and Thakurgaon, two northwestern districts were purposively selected since they account for a considerable portion of national wheat output (18.89%) [5]. Next, based on wheat production, Birganj Upazila (sub-district) from ~~Dinajpur~~ ~~Dinajpur~~ district and Thakurgaon Sadar, and Pirganj Upazila from ~~Thakurgaon~~ ~~Thakurgaon~~ district were chosen. A total of 150 wheat-producing farmers were selected using simple random sampling from the list. The survey was conducted from February to March 2019 during the wheat harvesting period. Data were collected using pre-tested interview schedules through ~~the~~ direct interview ~~method~~ ~~methods~~ with the respondents. Farmers were asked various questions regarding their socioeconomic status. The collected

Formatted: English (United States)

Formatted: English (United States)

Formatted: English (United States)

data were then scrutinized, tabulated, and analyzed according to the objective of the study. Descriptive statistical measures such as computation of mean, frequency, and percentage were employed to analyze the collected data.

Formatted: English (United States)

### 3. RESULTS AND DISCUSSION

The result and discussion section depicts socio-economic profile of the sampled wheat farmers of the study areas.

#### 3.1 Categorization of the Wheat Farmers According to Land Holding

Farmers were classified into four farm sizes: marginal, small, medium, and large. Farmers with 0.2 ha to 0.50 ha of land were considered as marginal farmers. Small farmers were those who farmed 0.51 to 1.00 ha of land, medium farmers cultivated 1.01 to 3.00 ha, and large farmers cultivated more than 3.00 ha of land [10]. Out of 150 farmers, approximately 22.67 percent, 28.67 percent, 40 percent, and 8.67 percent were marginal, small, medium, and large farmers, respectively (Table 1). This suggests that the majority of wheat producers in the study areas fall into the medium category.

**Table 1: Categorization of wheat farmers according to land holding**

Types of farmers	No.	Percent (%)
Marginal farmers	34	22.67
Small farmers	43	28.67
Medium farmers	60	40.00
Large farmers	13	8.67
All	150	100

Source: Field survey, 2019

Formatted: English (United States), Strikethrough

Formatted: English (United States)

Formatted: English (United States)

Formatted: English (United States)

Formatted: English (United States)

Formatted: English (United States)

Formatted: English (United States)

Formatted: English (United States)

Formatted: English (United States)

#### 3.2 Average size of land holding and farm size of the wheat farmers

Different types of farm size and tenure arrangements were found in the study area which may influence the optimum resource use in the production process. According [11], farm size is computed by the entire land area operated by the farmer. In this study, farm size is computed by adding the area of land owned, rented in/mortgaged in from others and subtracting the area rented out and mortgaged out to others.

Here, Farm size= Homestead area + Cultivated Land + Pond + Orchard + Fallow land + Leased in /mortgaged in - (rented out/mortgaged out) .

The average farm size of the marginal, small, medium, and large farmers was 0.36 ha, 0.74 ha ,1.68 ha and 4.84 ha respectively and for all farmers, it was 1.38 ha (Table 2). That implies that large farmers occupied more lands with comparison to medium, small farmers and marginal farmers.





Secondary	9	26.5	19	44.2	20	33.3	4	30.8	52	34.7
Higher Secondary	2	5.9	3	7.0	7	11.7	2	15.4	14	9.3
Tertiary	0	0	3	7.0	8	13.3	4	30.8	15	10
Total	34	100	43	100	60	100	13	100	150	100

Source: Field survey, 2019

### 3.5 Family Size of the Wheat Farmers

Family size is defined in this study as the total number of people living together and eating meals as a group out of the same kitchen[7]. The respondents' families were divided into three categories based on the number of members: small (up to 3), medium (between 4to6), and large (above 6). Table 5 shows that the average family size for the farmers in the sample was 4.96 persons per family, which is higher than the national average of 4.0 people per family [14]. In the study area, it was found that large farms had the largest families (5.77 persons per family), followed by medium farms (5.3 persons per family), small farms (4.67 persons per family), and marginal farms (4.38 persons per family). It can be assumed that large farm households had more opportunities to employ their family members as laborers in agricultural production than other farm households.

Table 5: Average family size of the wheat farmers

Category of farm household according family size	Marginal farmer		Small farmer		Medium farmer		Large farmer		All	
	No.	Percent(%)	No.	Percent(%)	No.	Percent(%)	No.	Percent(%)	No.	Percent
Small family	5	14.7	12	27.9	2	3.3	2	15.4	21	14.0
Medium family	28	82.4	25	58.1	48	80.0	6	46.2	107	71.3
Large family	1	2.9	6	14.0	9	15.0	5	38.5	21	14.0
Total	34	100	43	100	60	100	13	100	150	100
Total family members	149		201		317		77		744	
Average family size	4.38		4.67		5.3		5.77		4.96	

Source: Field survey, 2019

### 3.6 Farming Experience of the Wheat Farmers

Farming experience is an important socioeconomic factor that influences a farmer's efficiency in crop production. Farming experience may indicate the practical knowledge he has gained on how to tackle certain inherent farm production issues. Farmers must have prior expertise raising a specific crop in order to be efficient in crop management [11]. [15] found that experienced farmers were more efficient in managing and allocating productive resources to wheat cultivation than less experienced farmers. For the study, farming experience of the respondents is categorized into four groups in this study: less than 10 years, 11 years to 20 years, 21 years to 30 years, and more than 30 years (Table 6). On an average 41.3 percent of the sample farmers have more than 30 years of farming experience that was the highest compared to other groups. About 28.7 percent and 26.7 percent of the respondents had experience in wheat cultivation from 11 years to 20 years and 21 years to 30 years respectively. Only about 3.3 % of them had less than 10 years of experience in cultivation. The average farming experience was

highest(31.53 years) for medium farmers while it was lowest (26.58 years) for small farmers. All farmers have an average of 29.09 years of farming experience. This suggests that the majority of wheat producers are experienced in wheat farming activities.

**Table 6: Farming experience of wheat farmers**

Farming experience	Marginal farmer		Small farmer		Medium Farmer		Large farmer		All	
	No	Percent (%)	No	Percent (%)	No	Percent (%)	No	Percent (%)	No	Percent(%)
Less than 10 years	1	2.9	4	9.3	0	0	0	0	5	3.3
10 years to 20 years	13	38.2	14	32.6	13	21.7	3	23.1	43	28.7
21 years to 30 years	8	23.5	12	27.9	17	28.3	3	23.1	40	26.7
More than 30 years	12	35.3	13	30.2	30	50	7	53.8	62	41.3
Total	34	100	43	100	60	100	13	100	150	100
Average farming experience (yr)	27.06		26.58		31.53		31.46		29.09	

Source: Field survey, 2019

### 3.7 Occupational Status of Wheat Farmers

Occupation is one of the most important markers of socioeconomic position because it is directly tied to household income and living standards. The respondents are engaged with various types of occupation such as agriculture, business, service etc. in the study areas (Table 7). Agriculture is the most prevalent occupation, as seen in Table 7. Among 150 farmers, about 92% of the respondents were engaged with agriculture mainly wheat cultivation as their main occupation while rest of them chose other occupation as their primary source of living. About 8% of the respondents chose agriculture as their secondary occupation. Agriculture as the main occupation was observed to be higher for the medium farm (98.33 percent) followed by small (95.35 percent), large farm (92 percent) and marginal (82.35 percent). On the other side, business, and service as the main occupations of all sample farmers constituting 0.67 and 4 percent respectively.

**Table 7 : Occupational status of wheat farmers**

Primary occupation	Small farmer									
	Marginal farmer		Medium farmer		Large farmer		All			
	No.	Percent(%)	No.	Percent(%)	No.	Percent(%)	No.	Percent(%)	No.	Percent(%)
Agriculture	28	82.35	41	95.35	59	98.33	10	76.92	138	92
Business	1	2.94	0	0.00	0	0.00	0	0	1	0.67
Service	1	2.94	1	2.33	1	1.67	3	23.08	6	4.00
Others	4	11.76	1	2.33	0	0	0	0	5	3.33
Total	34	100	43	100	60	100	13	100	150	100

  

Secondary occupation	Small farmer									
	Marginal farmer		Medium farmer		Large farmer		All			

	No.	Percent(%)	No.	Percent(%)	No.	Percent(%)	No.	Percent(%)	No.	Percent(%)
Agriculture	6	17.65	2	4.65	1	1.6667	3	23.08	12	8
Business	3	8.82	3	6.98	6	10	1	7.69	13	8.67
Service	4	11.76	9	20.93	8	13.333	0	0	21	14.00
Others	7	20.59	10	23.26	7	11.667	2	15.38	26	17.33
No secondary occupation	14	41.18	19	44.19	38	63.333	7	53.85	78	52
Total	34	100	43	100	60	100	13	100	150	100

Source: Field survey, 2019

### 3.8 Average Annual Income of Wheat Farmers

The income activities were classified into two categories: Farm income (crop cultivation, livestock rearing, pond fish farming, homestead etc.); Off-farm income (day labour, vehicle driving, rickshaw pulling, shop keeping, services, etc.). It has been found from Table 6 that the average annual income from different sources of marginal, small, medium, and large farmers were Tk. 112721.80, Tk 145434.90, Tk.259428.00 and Tk. 484434.60 respectively and overall average annual income from different sources of the selected farmers was Tk. 212997.1 (Table 8). It is observed that wheat farmers lion share (70.69 percent) of income come from farming activities and rest from off-farm income generating activities(29.31 percent).

Table 8 :Average annual income of the wheat farmers

Source of income	Marginal farmer		Small farmer		Medium Farmer		Large farmer		All	
	Income (TK)	Percent (%)	Income (TK)	Percent (%)	Income (TK)	Percent (%)	Income (TK)	Percent (%)	Income (TK)	Percent (%)
Farm	65280.59	57.91	103588.40	71.23	186348.30	71.83	363819.20	75.10	150562.6	70.69
Off-farm	47441.18	42.09	41846.51	28.77	73079.67	28.17	120615.40	24.90	62434.53	29.31
Total	112721.80	100	145434.90	100	259428.00	100	484434.60	100	212997.1	100.00

Source: Field survey, 2019

### 3.9 Average annual expenditure of the wheat farmers

Average annual expenditure of the farmers in the study areas is illustrated in table 9. The major sectors of farmers' expenditure were food, clothes, medical expenses, education, electricity, transportation, festivals, and miscellaneous items. Table 9 that the average annual expenditure in different source of

marginal , small, medium, and large farmers were Tk. 103044.1, Tk 119709.3, Tk. 205283.3 and Tk. 215846.2 respectively and overall average annual expenditure of the selected farmers was Tk. 643882.9 (Table 9).

**Table 9 :Average annual expenditure of the wheat farmers**

Average annual expenditure (TK)	Marginal farmer	Small farmer	Medium Farmer	Large farmer	All
	103044.1	119709.3	205283.3	215846.2	643882.9

Source: Field survey, 2019

### 3.10 Training status of the Wheat Farmers

Training is an important means for obtaining technological skills. It contributes to farmers' increased knowledge and expertise in production methods and related challenges. In the study areas , farmers were trained by the Department of Agricultural Extension (DAE) on production methods, fertilizer, and insecticide use, harvesting procedures, and so on. The study revealed that marginal (14.71 percent), small (23.26 percent), medium (45 percent), and large (31 percent) farmers received training on wheat farming. It was also observed that medium farmers are more engaged in training achievement than other farmers in the study areas (Table 10). This finding coincides with [8].

**Table 10 :Training status of the wheat farmers**

Training status	Marginal farmer		Small farmer		Medium farmer		Large farmer		All	
	No.	Percent(%)	No.	Percent(%)	No.	Percent (%)	No.	Percent (%)	No.	Percent(%)
Training received	5	14.71	10	23.26	27	45.00	4	31	46	30.67
not received	29	85.29	33	76.74	33	55.00	9	69	104	69.33
Total	34	100	43	100	60	100	13	100	150	100

Source: Field survey, 2019

### 3.11 Credit Status of the Wheat Farmers

Agricultural credits are crucial to the management of farms. Several banks and non-governmental organizations (NGOs) provide financing to farmers, and farmers use these credit services to expand their agricultural operations and incomes. Credit also assists farmers in successfully managing their farms. In this study, approximately 53.33% of respondents obtained credit from banks or NGOs. On the other hand, around 46.67% of the respondents got no credit (Table 11).

**Table 11 : Credit status of the sample farmers**

Credit status	Marginal farmer		Small farmer		Medium farmer		Large farmer		All	
	No.	Percent(%)	No.	Percent(%)	No.	Percent (%)	No.	Percent (%)	No.	Percent (%)
credit	22	64.71	21	48.84	29	48.33	8	61.54	80	53.33

received										
not received	12	35.29	22	51.16	31	51.67	5	38.46	70	46.67
	34	100	43	100	60	100	13	100	150	100

Source: Field survey, 2019

The candidate manuscript does not have a robust scientific discussion. I suggest the authors incorporate the suggested paragraphs, in this way it would improve the scientific quality of the manuscript.

The socio-economic status of wheat growers and other tropical crop farmers in indigenous, rural, and agricultural territories of Latin America is a complex and multifaceted issue. There are a variety of factors that influence the economic well-being of these farmers, including access to resources [16, 17], land ownership [18, 19, 20], government policies[21], market dynamics, and cultural norms[22, 23].

In many cases, wheat growers and other tropical crop farmers in indigenous and rural territories face significant challenges in accessing the resources they need to be successful. These challenges may include limited access to credit, inadequate infrastructure, and a lack of education or technical expertise [24, 25]. Additionally, many of these farmers may not have legal title to their land, which can make it difficult for them to secure financing or access government programs.

Despite these challenges, there are also many examples of successful wheat growers and tropical crop farmers in indigenous and rural territories of Latin America. These farmers often rely on traditional farming methods and have a deep understanding of the local environment and ecosystem [26, 27]. They may also benefit from close-knit communities and strong cultural ties to the land [28, 29].

In recent years, there has been growing interest in supporting sustainable agriculture and local food systems in Latin America [30, 31]. This has led to increased investment in small-scale farming and initiatives aimed at strengthening the economic and social well-being of rural communities[32, 33]. For example, some organizations have worked to provide training and technical assistance to farmers, while others have focused on building market linkages and improving access to credit and other resources[34, 35].

Overall, the socio-economic status of wheat growers and other tropical crop farmers in indigenous, rural, and agricultural territories of Latin America is a complex and dynamic issue that requires a multifaceted approach. Efforts to support these farmers must take into account the diverse range of factors that influence their economic well-being, as well as the cultural and environmental contexts in which they operate. By working to build strong, sustainable local food systems, we can help to ensure that these farmers have the resources they need to thrive and contribute to their communities.

#### 4. CONCLUSIONS

The study investigates the different socio-economic factors of the wheat farmers. In examining socioeconomic characteristics, farm size and land holding pattern, age, educational and occupational status, family size, average yearly income and expenditure, training and credit facilities received by the sample farmers were considered. Based on their socioeconomic traits, the study discovers certain distinctions among marginal small, medium, and large farmers. The study found that majority of the farmers were middle aged. Hence, they may commit themselves actively to the production of wheat. Most farmers have completed their secondary education, which indicates that they are better prepared to embrace modern farming technology. Yet, the sampled wheat growers also had high literacy rates. As most farmers have more than 30 years of experience, it is likely that they are skilled at producing wheat. It has been noted that wheat farmers' primary source of income is agriculture, specifically wheat cultivation. If modern inputs and production technology can be made available to farmers in time, yield and

Formatted: English (United States)

Formatted: English (United States)

Formatted: Font: Not Bold, Font color: Auto, English (United States)

Formatted: English (United States)

Formatted: Highlight

Formatted: Font: Not Bold, English (United States)

Formatted: Justified

Formatted: Font: Not Bold, English (United States)

Formatted: Font: Not Bold, English (United States)

Formatted: Font: Not Bold, English (United States)

Formatted: Font: Not Bold, English (United States)

Formatted: Font: Not Bold, English (United States)

Formatted: Font: Not Bold, English (United States)

Formatted: Font: Not Bold, English (United States)

Formatted: Font: Not Bold, English (United States)

Formatted: Font: Not Bold, English (United States)

Formatted: Font: Not Bold, English (United States)

Formatted: English (United States)

production of wheat may be increased which can help the farmers to increase income and improve livelihood conditions. The study identified that majority of farmers did not receive any training on modern wheat production methods or technologies. Therefore, Govt. should provide enough training facilities to these farmers, as it is critical for enhancing agriculture productivity. The study found that more than half of the sample farmers obtained credit from both government and private banks, as well as non-governmental organizations, allowing them to use high-quality seeds, fertilizers, and insecticides to boost wheat production. It can be concluded that wheat farmers' attributes have a positive effect on wheat production, and there is significant potential to raise wheat productivity and consequently farmers' efficiency, income and employment prospects in the selected study areas of Bangladesh.

### CONSENT

According to international standard or university standard, respondents' written consent has been collected by the author.

### REFERENCES

**I suggest adding recent references which address the issue in question, suggested citations are for genuine scientific reasons that emphasize the current topic of study in context.**

1. Karim MR, Awal MA, Akter M. Forecasting of wheat production in Bangladesh. *Bangladesh Journal of Agricultural Research*. 2010, 35(1), 17–28. <https://doi.org/10.3329/bjar.v35i1.5863>
2. BBS. Yearbook of Agricultural Statistics, Bangladesh Bureau of Statistics (BBS), Statistics and Informatics Division (SID), Ministry of Planning, Government of the People's Republic of Bangladesh, Dhaka, 2021.
3. Prothom Alo (2022). Accessed 15 February 2023. Available: <https://en.prothomalo.com/business/local/bangladesh-plans-to-import-1m-tonnes-of-wheat-from-india#:~:text=Country's%20annual%20wheat%20demand%20stands,%2C%20Ukraine%20and%20Canada>.
4. Hossain A, Teixeira da Silva JA. Wheat production in Bangladesh: its future in the light of global warming. *AoB Plants*. 2013, 5. <https://doi.org/10.1093/aobpla/pls042>
5. BBS. Yearbook of Agricultural Statistics. Bangladesh Bureau of Statistics (BBS), Statistics and Informatics Division (SID), Ministry of Planning, Government of the People's Republic of Bangladesh, Dhaka, 2020.
6. Financial express (2022). Accessed 15 February 2023. Available: <https://thefinancialexpress.com.bd/trade/wheat-production-fall-raises-food-security-concerns-1641609591>
7. Beharielal, T.; Thamaga-Chitja, J.; Schmidt, S. Socioeconomic Characteristics Associated with Farming Practices, Food Safety and Security in the Production of Fresh Produce—A Case Study including Small-Scale Farmers in KwaZulu-Natal (South Africa). *Sustainability*. 2022, 14, 10590. <https://doi.org/10.3390/su141710590>
8. Datta T, Saha JK, Rahman MA, Akter M, Ahmed MR. Socio-Economic Status of Pineapple Growers in Moulvibazar District of Bangladesh. *Asian Journal of Agricultural Extension, Economics & Sociology*. 2020, 38(8): 152-161.

Formatted: Highlight

Formatted: English (United States)

Formatted: Default Paragraph Font, Font: (Default) +Body, 11 pt, Pattern: Clear

Formatted: No underline, Font color: Auto, English (United States)

Formatted: English (United States)

Formatted: No underline, Font color: Auto, English (United States)

Formatted: Default Paragraph Font, Font: (Default) +Body, 11 pt

Formatted: No underline, Font color: Auto, English (United States)

Formatted: English (United States)

Formatted: No underline, Font color: Auto, English (United States)

Formatted: English (United States)

Formatted: No underline, Font color: Auto, English (United States)

Formatted: English (United States)

Formatted: No underline, Font color: Auto, English (United States)

Formatted: English (United States)

Formatted: No underline, Font color: Auto, English (United States)

Formatted: English (United States)

Formatted: No underline, Font color: Auto, English (United States)

Formatted: English (United States)

9. Alam MN, Uddin MT, Moniruzzaman M, Tabassum N, Haque MM. Socio-economic Characteristics of the Tomato Farmers in Selected Areas of Chapainawabganj District. *Fundamental and Applied Agriculture*. 2016,1(2): 101-105.

10. BBS. Yearbook of Agricultural Statistics of Bangladesh, Bangladesh Bureau of Statistics, Statistics Division, Ministry of Planning, Government of the People's Republic of Bangladesh, Dhaka, 2011.

11. Yang WY. Methods of farm management investigation for improving farm. 1965.

12. Samarpitha A, Vasudev N, Suhasini K. Socio-economic characteristics of rice farmers in the Combined State of Andhra Pradesh. *Asian Journal of Agricultural Extension, Economics & Sociology*, 2016,13(1):1-9.

13. Nanda A, Sarkar R, Mondal S. The socioeconomic status of pineapple growers under contract farming condition. *Indian Journal of Agricultural Research*. 2012, 46(3):256-261.

14. Population and housing census (2022). Accessed 16 February 2023. Available: [https://sid.gov.bd/sites/default/files/files/sid.portal.gov.bd/notices/6795babc\\_d7df\\_4e58\\_aa00\\_2cb31158dc55/Key%20findings%20PHC%202022%20\(27.07.22\).pdf](https://sid.gov.bd/sites/default/files/files/sid.portal.gov.bd/notices/6795babc_d7df_4e58_aa00_2cb31158dc55/Key%20findings%20PHC%202022%20(27.07.22).pdf)

15. Tasnim Z, Hafeez ASMG, Majumder S. Climate change and wheat production in drought prone areas of Bangladesh – a technical efficiency analysis. *J Agric Sci*. 2014,7(1):43–53. <https://doi.org/10.5539/jas.v7n1p43>

16. Olivares B. Application of Principal Component Analysis (PCA) in socio-environmental diagnosis. Case: The Campo Alegre sector, Simón Rodríguez municipality, Anzoátegui. *Revista Multiciencias*, 2014, 14 (4): 364 – 374. <https://www.redalyc.org/articulo.oa?id=90433839011>

17. Olivares B, Franco E. Agrosocial diagnostic of the indigenous community of Kashaama: An empirical study in the state of Anzoátegui, Venezuela. *Revista Científica Guillermo de Ockham*, 2015, 13 (1): 87-95. <https://www.redalyc.org/articulo.oa?id=105342821008>

18. Rodríguez M.F, Olivares B, Cortez A., Rey J.C, Lobo D. Physical Natural Characterization of Indigenous Community Kashaama for Sustainable Land Management. *Acta Nova*, 2015, 7 (2):143-164. <https://n9.cl/9e53qr>

19. Orlando, B. Description of soil management in agricultural production systems in the Hammock sector in Anzoátegui, Venezuela. *La Granja: Revista de Ciencias de la Vida*, 2016, 23(1): 14–24. <https://n9.cl/ycp08>

20. Cortez, A., Muñetones, A., Casana, S., Orlando, B. Strategic Elements of Organizational Knowledge Management for Innovation. Case: Agrometeorology Network. *Revista Digital de Investigación en Docencia Universitaria*, 2016, 10 (1): 68-81. <http://dx.doi.org/10.19083/ridu.10.446>

21. Cortez A., Olivares B., Rodríguez M.F, Rey J.C., Lobo D. Desarrollo del sistema de información de la red de pluviómetros alternativos en medios rurales. Caso: Anzoátegui, Venezuela. *Acta Universitaria* 2016, 26 (4):65-76. [10.15174/au.2016.961](https://doi.org/10.15174/au.2016.961)

22. Olivares, B., Zingaretti, M.L., Demey Zambrano, J.A. y Demey, J.R. Typification of agricultural production systems and the perception of climate variability in Anzoátegui, Venezuela. *Revista FAVE - Ciencias Agrarias*. 2016, 15 (2): 39-50. <https://doi.org/10.14409/fa.v15i2.6587>

23. Orlando, B., Lobo, D., Cortez, A., Rodríguez, M.F., Rey, J.C. Socio-economic characteristics and methods of agricultural production of indigenous community Kashaama, Anzoátegui, Venezuela. *Rev. Fac. Agron. (LUZ)* 2017, 34 (2): 187-215. <https://n9.cl/p2qc5>

- Formatted: No underline, Font color: Auto, English (United States)
- Formatted: English (United States)
- Formatted: No underline, Font color: Auto, English (United States)
- Formatted: English (United States)
- Formatted: No underline, Font color: Auto, English (United States)
- Formatted: English (United States)
- Formatted: No underline, Font color: Auto, English (United States)
- Formatted: English (United States)
- Formatted: No underline, Font color: Auto, English (United States)
- Formatted: English (United States)
- Formatted: No underline, Font color: Auto, English (United States)
- Formatted: English (United States)
- Formatted: No underline, Font color: Auto, English (United States)
- Formatted: English (United States)
- Formatted: No underline, Font color: Auto, English (United States)
- Formatted: English (United States)
- Formatted: No underline, Font color: Auto, English (United States)
- Formatted: Spanish (Spain, International Sort)
- Formatted: No underline, Font color: Auto, Spanish (Spain, International Sort)
- Formatted: Spanish (Spain, International Sort)
- Formatted: No underline, Font color: Auto, English (United States)
- Formatted ... [4]
- Field Code Changed
- Formatted: Spanish (Spain, International Sort)
- Formatted: Spanish (Spain, International Sort)
- Formatted ... [5]
- Formatted ... [6]
- Formatted ... [7]
- Formatted ... [8]
- Field Code Changed
- Formatted ... [9]
- Formatted ... [10]
- Formatted: Spanish (Spain, International Sort)
- Formatted ... [11]

24. Camacho R., Olivares, B., Avendaño, N. Agricultural landscapes: an analysis of the livelihoods of venezuelans indigenous people. *Revista de Investigación*, 2018, 42(93):130-153. <https://n9.cl/9utqc>
25. Guevara, E., Olivares, B., Demey, J. Use of and Demand for Agrometeorological Information in Agricultural Production Systems, State of Anzoátegui, Venezuela. *Revista Multiciencias*, 2012, 12 (4): 372-381. <https://n9.cl/yuyd>
26. Demey J, Olivares B, Guevara E. The Use of Climate Biomarkers in Agricultural Production Systems, Anzoátegui, Venezuela. *Revista Multiciencias* 2012, 12 (2): 136-145. <https://n9.cl/s0ibg2>
27. Campos-Olivares, B. Valorización del conocimiento ancestral y local mediante la percepción del clima en comunidades agrícolas indígenas del Sur de Anzoátegui, Venezuela. *Revista UDO Agrícola*, 2012, 12 (2):407-417. <https://n9.cl/6zaug>
28. Olivares, B. Transición del monólogo científico a la pluralidad cultural: conectando países para el fortalecimiento del conocimiento climático local latinoamericano. *Revista Nexos*, 2013, 2 (1): 32-45. <https://n9.cl/fe5ndp>
29. Campos, B. O., Cortez, A. La extensión agrícola en territorios indígenas Kariña de Venezuela: Hacia el desarrollo local sostenible con identidad. Editorial Académica Española, 2017.
30. Olivares, B. Relationship of nature climate and spirituality of indigenous communities' state agricultural Anzoátegui Kariña, Venezuela. *Revista Tiempo y Espacio*, 2014, 61 (2): 129-150. <https://n9.cl/wx7q2>
31. Hernández R, Olivares B. Application of multivariate techniques in the agricultural land's aptitude in Carabobo, Venezuela. *Tropical and Subtropical Agroecosystems* 2020, 23(2):1-12. <https://n9.cl/zeedh>
32. Olivares, B., Pitti, J., Montenegro, E. Socioeconomic characterization of Bocas del Toro in Panama: an application of multivariate techniques. *Revista Brasileira de Gestao e Desenvolvimento Regional*, 2020, 16(3):59-71. <https://doi.org/10.54399/rbgdr.v16i3.5871>
33. Montenegro E, Pitti J, Olivares B. Adaptation to climate change in indigenous food systems of the Teribe in Panama: a training based on CRISTAL 2.0. *Luna Azul*, 2021, 51, 2, 182 - 197. <https://n9.cl/qwwz>
34. Montenegro, E; Pitti, J; Olivares, B. Identificación de los principales cultivos de subsistencia del Teribe: un estudio de caso basado en técnicas multivariadas. *Idesia* 2021, 39,3: 83 - 94. <http://dx.doi.org/10.4067/S0718-34292021000300083>
35. Pitti, J; Olivares, B; Montenegro, E. The role of agriculture in the Changuinola District: a case of applied economics in Panama. *Tropical and Subtropical Agroecosystems*, 2021, 25(1), 1 - 11. <https://www.revista.cba.uady.mx/ojs/index.php/TSA/article/view/3815>

Formatted: No underline, Font color: Auto, English (United States)

Formatted: English (United States)

Formatted: English (United States)

Field Code Changed

Formatted: No underline, Font color: Auto, English (United States)

Formatted: No underline, Font color: Auto, English (United States)

Formatted: No underline, Font color: Auto, English (United States)

Formatted: Spanish (Spain, International Sort)

Formatted: Spanish (Spain, International Sort)

Formatted: No underline, Font color: Auto, Spanish (Spain, International Sort)

Field Code Changed

Formatted: Spanish (Spain, International Sort)

Formatted: No underline, Font color: Auto, Spanish (Spain, International Sort)

Formatted: Spanish (Spain, International Sort)

Formatted: No underline, Font color: Auto, Spanish (Spain, International Sort)

Field Code Changed

Formatted: Spanish (Spain, International Sort)

Formatted: No underline, Font color: Auto, Spanish (Spain, International Sort)

Formatted: Spanish (Spain, International Sort)

Formatted: No underline, Font color: Auto, Spanish (Spain, International Sort)

Formatted: No underline, Font color: Auto, English (United States)

Formatted: No underline, Font color: Auto, English (United States)

Formatted: No underline, Font color: Auto, English (United States)

Formatted: No underline, Font color: Auto, Portuguese (Brazil)

Field Code Changed

Formatted: Portuguese (Brazil)

Formatted: Portuguese (Brazil)

Formatted: No underline, Font color: Auto, Spanish (Spain, International Sort)

Field Code Changed

Formatted: Spanish (Spain, International Sort)

Formatted: Spanish (Spain, International Sort)

Formatted: No underline, Font color: Auto, Spanish (Spain, International Sort)

Formatted: English (United States)

**Page 5: [1] Formatted** **Autor**

English (United States), Strikethrough

**Page 5: [2] Formatted** **Autor**

English (United States), Strikethrough

**Page 5: [3] Formatted** **Autor**

English (United States), Strikethrough

**Page 12: [4] Formatted** **Autor**

No underline, Font color: Auto, English (United States)

**Page 12: [5] Formatted** **Autor**

No underline, Font color: Auto, English (United States)

**Page 12: [6] Formatted** **Autor**

No underline, Font color: Auto, English (United States)

**Page 12: [7] Formatted** **Autor**

No underline, Font color: Auto, English (United States)

**Page 12: [8] Formatted** **Autor**

No underline, Font color: Auto, Spanish (Spain, International Sort)

**Page 12: [9] Formatted** **Autor**

Hyperlink, No underline, Font color: Auto, Spanish (Spain, International Sort)

**Page 12: [10] Formatted** **Autor**

No underline, Font color: Auto, English (United States)

**Page 12: [11] Formatted** **Autor**

No underline, Font color: Auto, English (United States)