



Impact of Banking Finance on Gum Arabic Producers in North Kordofan, Sudan

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ABSTRACT

PURPOSE: This paper investigates the impact of banking finance on gum Arabic producers in terms of Gum production, income generation and standard of living in North Kordofan.

DESIGN AND METHODOLOGY: Data were collected via questionnaires and focus group discussion, where 65 gum Arabic producers were purposively interviewed. Data were analysed using descriptive statistics, and T test and linear regression, Statistical Packages for Social Sciences (SPSS) and Excel were applied to the analysis.

FINDINGS: The results showed that finance has a positive correlation ($P > 0.005$) on gum production, producers income and producers' standard of living. However, 26% of respondents used finance in terms of buying recommended production tools, 26% on food items, and 63% on labour. All producers (100%) mentioned that the main constraints of banking finance were insufficient, complicated, not delivered on time and the need for a guarantee. In contrast, all respondents stated that the main other services needed for gum producers at the production site are water points, health services, education, storage facilities and training. The study concluded that the banking finance has made a positive contribution towards gum arabic production.

RESEARCH LIMITATIONS/IMPLICATIONS: Banking finance is still limited although it has contributed positively in gum Arabic production, producers' income and standard of living. Not all producers have access to finance.

PRACTICAL IMPLICATIONS: The study recommended that banking finance should be sufficient and delivered on time.

KEYWORDS: *Finance; Gum Arabic Producers; North Kordofan.*

INTRODUCTION

The gum arabic (GA) belt runs halfway along the North, South Kordofan and Darfur states. It produces about 90% of Sudan's total gum yield (Jamal and Huntsinger, 1993), and contributes more than 70% to the global market (Eltahir *et al.*, 2024). Gum arabic has been produced in Sudan since ancient times, and it continues to play a vital socio-economic role in the lives of many people

(Tutu *et al.*, 2019). It is still pursued by tens of thousands of farmers in the rain-fed sector under both sand (*qoz*) and clay soil conditions in Sudan (Eltahir *et al.*, 2024). As a product of the small household farm system, GA has a good comparative advantage and relatively higher international competitiveness compared to other cash crops (Tarig *et al.*, 2016; Mohamed *et al.*, 2019). It also plays a vital role in rural livelihood income while contributing 12% of the country's gross domestic product (GDP) (Eltahir *et al.*, 2025a).

The total real financial benefits to farmers from cultivating GA stands were positive across the gum belt and economically more efficient and less labour-intensive compared to other alternative cash crops (Eltahir *et al.*, 2025a). In 2009, the Central Bank of Sudan introduced a policy for financing agriculture, industry and trades as well as the GA sector (Mohamed *et al.*, 2019). However, there have been some institutional problems regarding the lack of credit provided for gum production and traders in terms of quantity, timing, poor and less effective marketing and storage facilities, in addition to lack of gum processing and local consumption (Taha *et al.*, 2015); finance is the main problem facing GA producers in Kordofan state. Gum arabic producers face significant difficulties in accessing financial resources and financing institutions (Eltahir *et al.*, 2025a), and access to finance remains a critical limiting factor.

These challenges can lead to issues in GA sustainability (Shackleton *et al.*, 2010; Musa and Sahoo, 2023). Therefore, in order to solve the problem of having finance for the gum producers as individuals, the Gum Arabic Producers Associations (GAPAs) were established in North Kordofan State to address these challenges and constraints (Taha *et al.*, 2015; Eltahir *et al.*, 2025a). These GAPAs perform a significant role in supporting rural gum producers, promoting the production and marketing of GA, and providing essential production inputs, facilitating finance, improving infrastructure and raising awareness among producers (Ramly, 2002; IFAD, 2003; Taha *et al.*, 2015; Elzubair *et al.*, 2024). These efforts stabilise gum production and increase financial incomes for GA producers (Eltahir *et al.*, 2025a).

Several studies have discussed GA issues in the area such as the contribution of GA to rural livelihoods (Tutu *et al.*, 2019), GA tools evaluation among the producers (Eltahir *et al.*, 2023, 2024, 2025b), the value chain of GA (Hassan *et al.*, 2021), GA quality (Mujawamariya *et al.*, 2012); however, there are still limited studies on banking finance evaluation. This paper aims to assess the impact of banking finance on GA producers in terms of gum production, income generation and standard of living. The study hypothesises that banking finance during the gum production in production areas significantly improves gum production, rural income and standard of living. The findings of the study will help decision-making to find areas of weakness and support the GA producers during the production period to ensure sustainable GA production.



MATERIAL AND METHODS

Study Area

The study was conducted in Shiekan Locality, North Kordofan State, Sudan; This area lies between latitudes $12^{\circ}14''$ and $16^{\circ}38''$ N and longitudes $26^{\circ}56''$ and $32^{\circ}22''$ E, with a total area of 190.840km² (see Figure 1). The area is characterised by different climatic zones (IFAD, 2002) including desert in the North (with average rainfall of 100mm/annum), semi-desert in the middle (with average rainfall of 100-250mm/annum) and low rainfall woodland savannah in the South (between 250mm and 400mm/annum) and the high rainfall woodland savannah with average rainfall more than 400ml. The mean maximum temperature of the hottest months (April and May) ranges between 39°C to 40°C, and the mean minimum temperature of the coldest month (December and January) ranges from 8°C to 13°C. The main economic activities in the area include crops such as sesame, sorghum, millet, groundnut (Eltahir *et al.*, 2025a), livestock, and collection of non-wood forest products, particularly GA (Musa *et al.*, 2023).

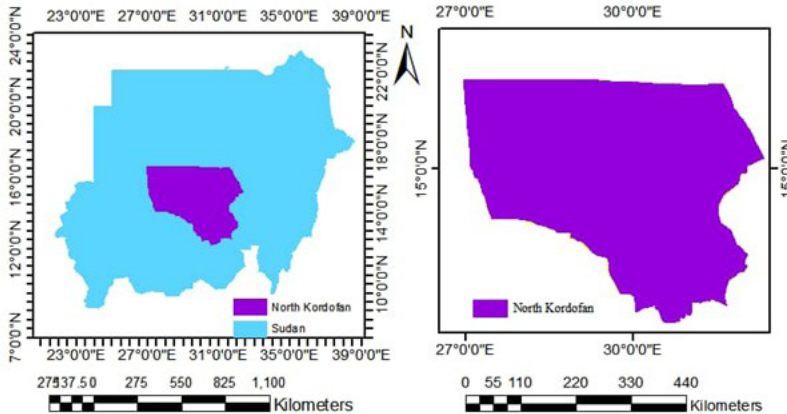


Figure 1: Map of the Study Area

Source: Constructed by authors

Data Collection

Data were collected from primary and secondary sources, with primary data being collected through focus group discussion. Key informants and structured questionnaires were distributed randomly to 65 respondents with a sampling percentage of 10%. Secondary data were collected from the reports of the FNC office and Central Bank of Sudan, El Obied branch, North Kordofan.

Data Analysis

Descriptive statistics were applied for data analysis where mean and percentages were calculated. Statistical Packages for Social Sciences (SPSS) and Excel were used for further data analysis such as regression and correlation.

Regression analysis, a general linear model involving independent variables was used as

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_p X_p + \varepsilon \quad (1)$$

Where Y = (dependent variable), X_1 , X_2 ... and X_p , are the independent variables, β_0 , = intercept (a constant of the regression model), β_1 , β_2 , ... and β_p = parameters should be estimated, and ε = Disturbance random error

Model Building

Regression analysis model building was expressed as follows:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \varepsilon \quad (2)$$

Where, Y = variable representing GA production, X_1 = the factor of financing acquisition procedures, X_2 = the factor of financing adequacy and benefit, β_0 = intercept (constant of regression model), β_1 = parameter representing the effect of the factor of financing acquisition procedures on income, β_2 = parameter representing the effect of the factor of financing adequacy and benefit on income, and ε = error

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \varepsilon \quad (3)$$

Where, Y = variable representing income of gum producers, X_1 = the factor of financing acquisition procedures, and X_2 = the factor of financing adequacy and benefit.

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \varepsilon \quad (4)$$

Where, Y = variable representing livelihoods standard of GA producers, X_1 = the factor of financing acquisition procedures, and X_2 = the factor of financing adequacy and benefit.

RESULTS

International Organisations Funded the Gum Arabic Sector in the Area

Due to importance of GA worldwide, several international organisations support GA producers in the gum belt in the form of projects under the supervision of local government (Table 1). Funds were also provided for the GA producers and the Forest National Corporation (FNC) for gum belt rehabilitation. These organisations supported GA producers in the form of food, provision of seedlings, water points and extension services. These kinds of support contributed positively in increasing the areas of GA gardens through plantation, improving GA production and the income

generation of the producers. The FNC received funds in terms of the establishment of nurseries, infrastructure (buildings and furniture) and vehicles; this helped the FNC in monitoring and distribution of resources to rural areas of the gum belt.

Table 1: International Organisation Funded Gum Arabic Sector in the Area

Project	Funding Organisation	Duration
Rehabilitation of Gum Arabic Belt, North Kordofan	UNSO	1981-1995
Rehabilitation of Gum Arabic Belt, West sector (Kordofan and Darfur)	UNDP and FAO	1981-1994
Agro-forestry and Forest Extension project, North Kordofan (Phase 1)	CARE	1986-1990
Agro-forestry and Forest Extension project, North Kordofan (Phase 2)	CARE/USAID	1988-1995
Improvement of GA production and Marketing project	FAO	1998-2000
Improvement of Gum Production and producers support project	Global Commodity Support Fund	2004-2006
Food security, poverty alleviation and combating Desertification Fund Project (Phase 1)	Italian Government/FAO	2004-2005
Food security, poverty alleviation and combating Desertification Fund Project (Phase 2)	Italian Government/FAO	2006-2015
Revitalising of GA production and Marketing	World Bank/IFAD	2008-2016

Source: Constructed by authors

Finance Introduction to Gum Arabic Producers by Savings and Social Development Bank in North Kordofan

This paper discusses the experience of the Savings and Social Development Bank in North Kordofan with regard to the provision of finance to GA producers (Table 2). With the guarantee of GAPAs, the bank provides funds for the gum producer in years (2010, 2011, 2012 and 2017) the mechanism depends on fixing the price of gum in advance and the finance distributed during the tapping periods. However, bank collects the gum from the producers during harvesting periods with advanced fixed price. Although, the price always lower than the current price while the amount of found per producer depend on the areas of gum garden owned by producer. Meanwhile, the advance fixed price is lower compared to current price but help producers to engage actively in GA production.

Table 2: Amount of Funds Provided by the Savings and Social Development Bank in North Kordofan, 2010- 2017

Year	2010	2011	2012	2017
Amount of finance granted to the producers	100,000	3,699,317	1,250,000	2,400,000
Number of financed GAPAs	4	138	5	2
Number of financed producers	2,000	6,500	2,500	100

Source: Constructed by authors



Contribution of Other Banks in Funding Gum Arabic Sectors in the Area

As GA is a commodity of high economical value and play important role in country economy as well as increasing the revenue of the commercial banks, several commercial banks contributed in funding GA sector at North Kordofan state (see Figure 2), which contributed positively in the development of GA sector in the state as well as increasing GA production.

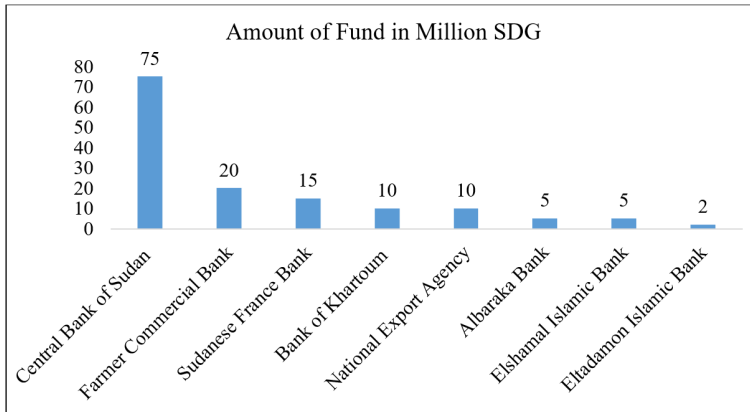


Figure 2: Contribution of Other Banks in Funding Gum Arabic Sectors in the Area

Source: Fieldwork of current study

Uses of Finance by Gum Arabic Producers in the Area

The producer expresses their option of using the finance (see Figure 3). However, 11% of respondents stated that the fund received from different funding sources they use in buying new recommended tools for production such as tapping tools (Sonki) and collection tool (gum harvester) which help them in producing clean gum and receive high price. While 26% stated that use in buying food items and other necessary items. The majority of respondents (63%) use the finance for introducing labours in their gum gardens in order to increase the number of tapped trees as well as increasing gum production.

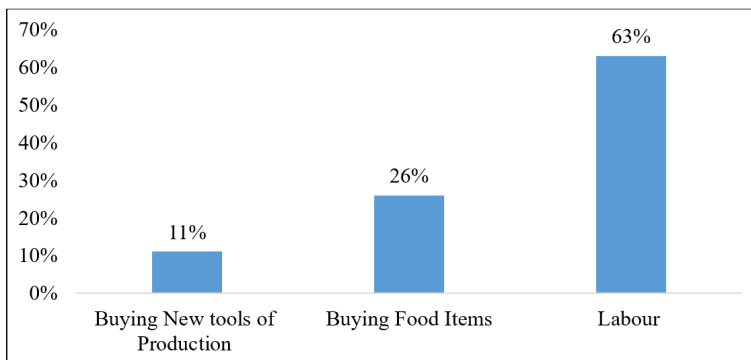


Figure 3: Uses of Finance by Gum Arabic Producers in the Study Area

Source: Fieldwork of current study

Impact of Banking Finance on Gum Arabic Production in the Study Area

The results of the regression analysis model showed that the GA production is positively affected by the factor of financing obtaining to procedures and positively affected by the factor of financing adequacy and benefit (Table 3). The estimated parameters of these variables passed the individual significance test (T-Test) because the probability value of the test was less than the permissible error for the test (5%). The model also passed the overall significance test (F-Test) because the calculated F-value was 134.352 with a probability of (0.000), which is less than the permissible error for the test (5%). There is no first-degree autocorrelation problem because the calculated Durbin-Watson value was 1.996, which is greater than 1.5. This model has a high explanatory power because the value of the coefficient of determination was 0.806. This is evidence that the model explains 80% of the changes in production, and 20% is due to factors do not present in the model. The variable of financing obtaining procedures, which consists of five statements, has the greatest effect (0.682) on production, followed by the variable of financing adequacy and benefit, which consists of four statements (0.244). Therefore, we find that bank financing for GA producers has a positive effect on production.

Table 3: Estimating the Linear Regression Model for the Impact of Bank Financing Granted to Gum Arabic Production

Variables	Estimated parameters		T test	Probabilities
	B	Standard Error		
Finance obtaining procedures factor	0.682	0.107	6.250	0.000
Finance adequacy factor	0.244	0.133	2.231	0.029
Correlation	0.901			
R Square	0.813			

Adjusted R Square	0.806
F Test	134.352
Durbin-Watson	1.966

Source: Constructed by authors

Impact of Banking Finance on Gum Arabic Producers' Income in the Study Area

The results indicated that the income is positively affected by the factor of financing obtaining procedures and positively affected by the factor of financing adequacy and benefit (Table 4). The estimated parameters of these variables passed the individual significance test (T-Test) because the probability value of the test was less than the permissible error for the test (5%). The model also passed the overall significance test (F-Test) because the calculated F-value was 50.238 with a probability of (0.000), which is less than the permissible error for the test (5%). There is no first-degree autocorrelation problem because the calculated Durbin-Watson value was 1.876, which is greater than 1.5. This model has a high explanatory, because the value of the coefficient of determination was 0.787. This is evidence that the model explains 78% of the changes in production, and 22% is due to factors do not present in the model. The variable of financing obtaining procedures, which consists of five statements, has the greatest effect (0.473) on income, followed by the variable of financing adequacy and benefit, which consists of four statements (0.341). Therefore, we find that bank financing for GA producers has a positive effect on income.

Table 4: Estimating the Linear Regression Model for the Impact of Banking Financing on Gum Arabic Producer's Income

Variables	Estimated parameters		T test	Probabilities
	B	Standard Error		
Finance obtaining procedures factor	0.473	0.118	3.034	0.004
Finance adequacy factor	0.341	0.146	2.192	0.032
Correlation	0.606			
R Square	0.619			
Adjusted R Square	0.787			
F Test	50.24			
Durbin-Watson	1.876			

Source: Constructed by authors

Impact of Banking Finance on Gum Arabic Producer's Standard of Living in the Study Area

The results presented that the standard of living for GA producers is positively affected by the factor of financing obtaining procedures and positively affected by the factor of financing adequacy and benefit (Table 5). The first variable, the factor of finance obtaining procedures, passed the individual significance test (T-Test) because the probability value of the test was less than the permissible error for the test (5%). However, the second variable, financing adequacy and benefit, did not pass the individual significance test because the probability value of the test was greater than the permissible error for the test (5%). But the model passed the overall significance test (F-Test) because the calculated F-value was 119.446 with a probability of (0.000), which is less than the permissible error for the test (5%). There is no first-degree autocorrelation problem because the calculated Durbin-Watson value was 1.603, which is greater than 1.5. This model has a high explanatory power because the value of the coefficient of determination was 0.891. This is evidence that the model explains 89% of the changes in the standard of living, and 11% is due to factors not present in the model. The variable of finance obtaining procedures, which consists of five statements, has the greatest effect (0.759) on the standard of living, followed by the variable of financing adequacy and benefit, which consists of four statements (0.149). Therefore, we find that bank financing for GA producers has a positive effect on the standard of living.

Table 5: Estimating the Linear Regression Model for the Impact of Bank Financing Granted to Gum Arabic Producer's Livelihoods Standard Level

Variables	Estimated parameters		T test	Probabilities
	B	Standard Error		
Finance obtaining procedures factor	0.759	0.111	6.631	0.000
Finance adequacy factor	0.149	0.090	1.302	0.198
Correlation	0.787			
R Square	0.794			
Adjusted R Square	0.891			
F Test	119.45			
Durbin-Watson	1.603			

Source: Constructed by authors

Prerequisites of Financing Gum Arabic Producer

As stated by village leaders and GAPAs executive committee, eligibility criteria for formers to receive funds were that the producer must be a member of a GAPA (because the funds were granted with a guarantee by the GAPAs), they had to own a GA garden, practice GA production for the

assurance of producing the quantity of gum equivalent to amount of the received funds, and be a resident in order to participate in all other social and co-operative works associated with gum production practices.

Constraints of Banking Finance for Gum Arabic Producers in the Study Area

The results showed that all respondents faced financial constraints in the GA belt (see Figure 4). The amount of finance was insufficient and did not cover the farmers' needs for GA production. Also, financial support was not delivered at an appropriate time for tapping; this had a negative impact on the number of tapped trees, leading to a reduction in gum production. The process was long and complicated, and producers did not have assets to provide guarantees to the bank.

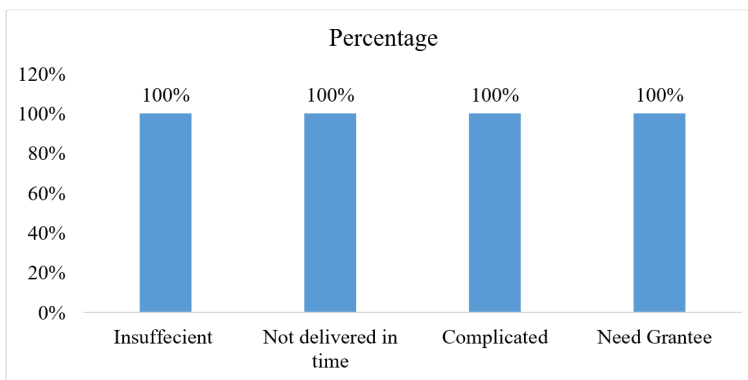


Figure 4: Constraints of Banking Finance for Gum Arabic Producers in the Study Area

Source: Fieldwork of current study

Other Services Needed in Gum Production Areas

In addition to financial support, the results show that other services were needed at the production sites, as mentioned by all respondents (100%) (Table 6). Water points are very important in production areas as they save farmers time in searching for water. It would also increase working hours in their gum gardens, increase the production area, increase gum production and maximise income. Health services would, at a minimum, provide the necessary care as well as first aid, and education would increase farmers' awareness of the environmental benefits of *Acacia senegal* trees in addition to the production of GA. Storage facilities are needed in production areas for the GAPAs to collect large quantities of GA to attract big traders and companies when buying gum and reduce the cost of transportation. Linking GAPAs with companies and wholesalers in the form of smart partnerships in order to remove the middlemen and obtain higher prices. Disseminating market information through the media, e.g., radio, is important to make producers aware of the gum price in central markets; this would also be useful to increase their bargaining power.

Table 6: Other Services Needed at Production Areas in the Study Area

Percentage of Respondents (%)	Needed Services
Water points	100%
Health services	100%
Education	100%
Storage facilities	100%
Linking GAPAs with traders and companies	100%
Market Information	100%

Source: Constructed by authors

DISCUSSION

This study investigates the impact of financial interventions on the GA sector in North Kordofan, Sudan. It examines funding from international organisations and local banks, focusing on the effects on producers' production, income, and standard of living. The study highlights the positive impact of financial support but also reveals significant constraints and additional service needs. International funding effectively increased GA garden areas through seedling provision, and enhanced production through improved water access and extension services. In contrast, banks provided financing based on pre-fixed gum prices, with disbursement during tapping and collection during harvesting. In addition, the loan amounts were tied to the size of gum gardens. This funding improved the livelihoods of producers, confirming that external support can contribute positively to the sector's growth. The establishment of nurseries, infrastructure, and vehicles for the FNC enhanced its efficiency in supervising forest lands and gum gardens, underscoring the importance of institutional strengthening.

The commercial bank's involvement positively contributed to the sector's development and increased production. This is essential because it reflects a broader, multi-institutional approach to the sector's development. Increased financing from commercial banks is a positive sign for the expansion and commercialisation of GA in North Kordofan. The finance was primarily used by producers to buy tools, purchase food, and hire labour. A significant percentage of producers (63%) utilised the finance for labour; this is crucial for increasing the number of tapped trees, production area and, ultimately, income. This reflects that labour is a key input for the scaling of production. On the other hand, purchasing tools and food helps stabilise their working conditions, but the focus on labour is the most crucial factor in boosting productivity.

The regression analysis confirmed that financing had a positive effect on GA production, indicating a strong positive correlation between financing (procedures, adequacy, and benefits) and (production, income, and standard of living). The model as a whole was significant: high R-squared

values indicate a strong model fit, significant F-tests and T-tests (except for one variable in standard of living) confirmed the model's reliability and the Durbin-Watson values indicate no first-degree autocorrelation. The financing obtained through banks, together with its adequacy and benefits, significantly increased production. The model's explanatory power (80%) demonstrates that bank financing is a crucial factor for producers in improving their production levels. The strong evidence from regression analysis revealed that bank financing significantly improves production, income, and living standards. In addition, the importance of financing procedures indicates that the ease and timeliness of obtaining funds are key for maximising production. The requirements for financing emphasise the importance of organisational and resource readiness for farmers to be eligible for funding. Membership in GAPAs, ownership of gum gardens, and active participation in production are sensible prerequisites that ensure farmers are committed to increasing production and meeting financial obligations. These criteria also encourage sustainable practices and organisation within the farming community.

A major constraint identified was insufficient finance that did not cover all needs, such as food and labour costs. The delayed disbursement of funds also had a negative impact on production. These issues suggest that while the concept of financing is sound, the timing, amount, and conditions need to be optimised. Additionally, the lengthy and complicated process of obtaining funds, together with the lack of collateral, makes accessing finance challenging for many producers. Beyond financial support, producers highlighted several essential services needed in production areas. These include water points, healthcare, education, storage facilities, and market linkages. The lack of access to water and basic health services restricts productivity, while better storage facilities and direct links with companies and traders could help reduce costs and increase income. The role of information dissemination, especially through media, is also vital for producers to make informed decisions about pricing and market conditions.

CONCLUSIONS AND RECOMMENDATIONS

Provision of adequate banking finance at an appropriate time for the GA producer will increase gum production, increase income generation and improve their livelihood. The introduction of other services at the production sites, such as water points, education, extension, health and storage facilities helping in resettlement of the producers in the sites and promoting the gum production. It is recommended that improving infrastructure in GA production areas is crucial for guaranteeing the sustainability of GA production. GAPAs should be empowered to address the financial challenges facing producers, other important services should be introduced, and GAPAs should be linked with private sectors (big traders, companies, processors) in the form of smart partnerships.



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