

Involvement of Gum Arabic Producers' Associations in Promoting Gum Arabic Production and Marketing in Ennuhud and West Bara Localities, Sudan

Mohamed E. Taha^{1,*}, Ismail F. Mugadam¹, Hatim M. A. Elamin², Bashir A. ElTahir³,
Osman Elsaid Adlan², Muneer E. S. Eltahir²

¹Department of Forestry and Range Sciences, Faculty of Natural Resources and Environmental Studies, University of Kordofan, Elobeid, Sudan

²Institute of Gum Arabic Research and Desertification Studies, University of Kordofan, Elobeid, Sudan

³Agroforestry & Ecosystem Analysis at Agricultural Research Corporation, Elobeid, Sudan

Email address

nour54321@yahoo.com (M. E. Taha), shalka87@gmail.com (I. F. Mugadam), hatim822002@yahoo.com (H. M. A. Elamin),
eltahirba48@gmail.com (B. A. ElTahir), osmanraasta@yahoo.com (O. E. Adlan), muneersiddig88@gmail.com (M. E. S. Eltahir)

To cite this article

Mohamed E. Taha, Ismail F. Mugadam, Hatim M. A. Elamin, Bashir A. ElTahir, Osman Elsaid Adlan, Muneer E. S. Eltahir. Involvement of Gum Arabic Producers' Associations in Promoting Gum Arabic Production and Marketing in Ennuhud and West Bara Localities, Sudan. *International Journal of Agriculture, Forestry and Fisheries*. Vol. 3, No. 5, 2015, pp. 182-188.

Abstract

The current study was carried out during the period from January 2012 to January 2014 in two important gum arabic producing areas: Ennuhud Locality in West Kordofan State and West Bara Locality in North Kordofan State, Sudan. It dealt with the role of Gum Arabic Producers' Associations (GAPAs) in gum arabic production and marketing in the targeted localities, in addition to general services provided by these associations. The study was based on primary and secondary data. Besides personal observations, primary data were collected using three types of structured questionnaires that were designed, pre-tested, and then randomly distributed among three groups of respondents: executive committees of associations, village local committees and members of associations. Secondary data were obtained from relevant sources, references and pertinent institutions. Data were analyzed using Statistical Packages for Social Sciences (SPSS), where descriptive statistical analysis was applied. The stakeholders involved in production and marketing of gum arabic in the two localities were GAPAs (63%), followed by Donors Aid Fund (33.3%) and village merchants (3.7%). Findings revealed that selection of GAPAs executive committee has been completed via agreement and/or conformity; nonetheless significant differences ($p \leq 0.05$) were reported between methods of selecting such identities in the two localities. The results pointed that the majority of executive committee members (88.9%) were fully satisfied by the efforts towards their members. The main services provided by GAPAs and acknowledged by the producers were mainly extension, marketing and finance, education, health and water. There were significant differences ($p \leq 0.05$) between the two localities with regard to extension services provided by GAPAs. The results showed that shortage of drinking water was the main problem in the targeted area. Considerable portion of respondents (64.4%) assured that water problem received low attention from the responsible agents. The study recommended that improving efficiency and capacity building of GAPAs committee members, promoting the spirit of entrepreneur within the gum producers as well as provision of infrastructure and basic needs are essential for settlement of producers.

Keywords

Associations, Committees, Conformity, Capacity Building, Infrastructure, Water Shortage

1. Introduction

Sudan is located between latitudes 8° - 22° N and longitudes 22° - 38° E, in the northeastern part of Africa

covering an area of 1,882,000 square kilometers (USAID, 2012). The vast longitudinal extension gives the Sudan unique ecological characters, from dry sandy desert in the northern central parts to high rainfall areas in the south (Sudanet, 2015). Besides being characterized by thorny low trees of low rainfall

savannah in the central belt to broad leaf high rainfall savannah in the southern part, the country is also covered with desert shrubs and stunted bushes. In the year 2011, the Sudan Central Bureau of Statistics estimated the population of the country to be some 39 million, growing at 2.7%. More than 30 million people live in rural areas (USAID, 2012).

The agricultural sector, the main component of the country's economy, is classified into traditional rain-fed farming system, mechanized rain-fed farming system and the irrigated farming system (CBS, 2005 & Adam, 2010). Although it receives less care and consideration from planning and decision making authorities, the traditional rain-fed agricultural subsector has a distinguished contribution in the national economy. It contributes by over 50% to the net foreign exchange earnings of the agricultural sector and generally provides the livelihood for the great majority (>80%) of the population who depend for their subsistence on agriculture and related activities (Abedelraheem, 2003; CBoS, 2012; USAID, 2012). Besides creating job opportunities, the traditional agricultural subsector provides a sizeable portion of the raw materials for local industries (Hashim, 1995). The major crops of this subsector are sesame, millet, sorghum and groundnuts, as well as gum arabic from *Acacia senegal* "Hashab" trees. This subsector is the main source of livestock as well.

Forests play an important role in the welfare of the Sudanese population and in conserving and protecting the environment and the development of the country's national economy. The vegetation cover protects soils against wind erosion and intense seasonal rainfall as well as it helps to maintain the levels of ground and surface water (Taha, 2006). The most important forest types in the Sudan include *Acacia nilotica*, *Acacia seyal*, *Acacia senegal*, *Balanites aegyptiaca*, *Acacia mellifera* and special forest types like Dom (*Hyphaene thebaica*), *Tamarix aphylla*, and montane forests (Harrison & Jackson, 1958; Sahni, 1968; Geller, *et al.*, 2009). As reported by the USAID (2012), the Forests National Corporation (FNC) estimated that after separation of South Sudan, forests cover about 11.60% of the total area, while agricultural land, range and water constitute 13.70%, 26.40%, and 0.17%, respectively.

Among a wide spectrum of plant exudates, gum arabic is the most important and usable gum and it includes both gums from *Acacia senegal* and *Acacia seyal* trees, INS No. 414 (JECFA, 1997), which are distributed in a continuous belt known as the "Gum Arabic Belt".

Sudan is recognized as the world dominant leader in gum arabic production; it contributes to about 95% of the total world gum arabic production (Abdulgadir, 2015). Sudan effectively controls almost over 80% of the world market (Anderson, 1993; GAC, 1996; Forman, 2012; Abdulgadir, 2015). Gum arabic provides an average of 12 percent of the gross domestic product (GDP) of the country. Gum production accounts for about 15.3 percent and 10 percent of the household income of gum producers and other farmers in the gum belt in Sudan, respectively (Elamin and Ballal, 1989; Mahmoud, 2004; Taha, 2006). The total real financial benefits

to farmers from cultivating gum arabic stands were found positive in many diverse systems across the gum belt, even when current market prices were used to calculate the financial profitability of such stands (Taha, 2006). It was ascertained that gum production was economically more efficient and much less labour intensive compared to all other alternative cash crops (Taha, 2006). As well, Mahmoud (2004) verified that gum arabic as a product of small household farm system has a good comparative advantage and relatively higher international competitiveness in relation to other competing cash crops. Gum production is characterised by a remarkable flexibility and it is a means for combating poverty; being so it provides insurance service against risks and uncertainties (Karama, 2001; Khalid, 2005).

In spite of all advantages highlighted, still there are constraints facing production of gum arabic and its local trade in the country, particularly in Kordofan that has been historically recognized as high productive area (GPsU, 2009). Factors contributed to reduction in producing areas and in turn gum productivity, were summarized by Dafalla (2002) to include: climate change and fluctuation of rainfall intensities, overgrazing, firing and ever-increasing agricultural lands. Also, decreasing international demand on gum arabic affected negatively the prices received by the small farmers and local traders (CBoS, 2010). Moreover, the monopolizing power of middlemen involved in local gum marketing, poor infrastructure and lack of inputs in gum production areas and inaccessibility to markets add negatively to effectiveness of local gum trade and to the price incentives received by the gum farmers (Mahmoud, 2004; MoF, 2005). There are some institutional problems exemplified in lack of credit provided for gum production in terms of quantity and timing, poor and less effective marketing and storage facilities, in addition to lack of gum processing and local consumption (OmPsU, 2005).

As a solution to all previously stated problems and constraints, the Associations of Gum Arabic Producers have been established in North Kordofan and West Kordofan States principally for the development of rural areas and farmers as well as gum producing trees, in addition to promotion of gum arabic production and marketing (IFAD, 2002; IFAD, 2003; Ramly, 2012; Elzubair *et al.*, 2015). The effectiveness of existing Gum Arabic Producers' Associations (GAPAs) could help to provide production inputs and facilitate local gum marketing, improve infrastructure and raise producer awareness and in turn serve stability of gum production and maximize farmer's reimbursements. The role of such institutions in Sheikan and Omrowaba Localities in North Kordofan State has been profoundly tackled by Elgaleem (2010). She focused on the involvement of Cooperative Societies of Gum Arabic Producers in gum arabic production and marketing, in addition to investigating general services provided. The main objective of the current study was to assess the role of Gum Arabic Producers' Associations (GAPAs) in production and marketing of gum arabic in Ennuhud Locality, West Kordofan State and West Bara Locality in North Kordofan State.

2. Materials and Methods

2.1. The Study Area Description

The study was conducted in Ennuhud Locality, West Kordofan State and West Bara Locality in North Kordofan State, which are situated in the heart of the gum arabic belt. West Kordofan State is located within latitudes 27°-29°N, and longitudes 14°-20°E. The state borders North Kordofan, South Kordofan, East Darfur, North Darfur and South Darfur. Its area is 14400 square kilometers extending from low rainfall savanna to high rainfall and hill catena and its vegetation varies greatly (Alshareef, 1994; IFAD, 2003; LGC, 2015). The northern part is dry with an average rainfall of 300mm per annum. The far most southern part of the state is characterized with high annual rainfall up to 400mm on the average and high vegetation density. As has been described by Hunting Technical Services in 1963, Ennuhud Locality comprises a number of soil types, the two major and most extensive types being the sandy (qoz) soils (70% of arable lands) in the northern part and the clay soils (30% of arable lands) dominating the southern part. North Kordofan State lies between latitudes 12° 40' - 17° 32'N, and longitudes 28° 40' - 32°-17'E with total area of 190840 square kilometers. Its soil type is sandy loam and the rainfall ranges between 75-250mm in the northern parts and increases gradually southwards reaching up to 500mm (Salim *et al.*, 2014). The state suffers from seasonal food gap and acute water shortage due to recurrent droughts (WFP, 2013; Care, 2104). The principal climatic zones of North Kordofan State have been summarized by IFAD (2002) to include: desert (with average rainfall of 100mm), semi-desert (covers 40% of the state area with average rainfall of 100 - 250mm), low rainfall woodland savannah (the approximate boundaries of this formation are between 250mm and 400mm) and the high rainfall woodland savannah that covers 8% of the state area including most of the southern part.

The variation of climatic zones and different soil types is reflected in the main economic activities of the inhabitants in the study area, which are based on integration of agriculture and animal production (IFAD, 2002; Mahmoud, 2004; Taha, 2006). As in other parts of the Sudanese Gum Arabic Belt, gum arabic from *Acacia senegal* is a component of the household farm system in the study area (Mahmoud, 2004; Taha, 2006; Ramly, 2012). In most rural parts and villages of the area, the main economic activity of people includes crop farming, animal keeping, gum tapping, casual labours, craft men, and others.

2.2. Methodology

To realize objectives of the study, both primary and secondary data were collected. Secondary information including published and unpublished material and reports were obtained from literature and official documents of respective institutions (i.e. Forests National Corporation, Central Bank of Sudan, Ministry of Finance and Economic Planning, gum processing and trading companies, Producers'

Associations and others). Primary data were obtained from personal observations and distribution of three types of purposively-structured questionnaires, informal discussions and interviews with the target respondents. Following designing closed questionnaires, a reconnaissance survey was carried out for questionnaire test and then application after necessary amendments have been introduced. The first questionnaire pertaining to personal information, demographic characteristics, socio-economic aspects and gum arabic production and marketing activities was introduced to gum farmers who are members of gum arabic associations in relevant villages. Depending on Twinklesoft (2012), 93 persons representing total population 1235 in respective villages were selected. The other two questionnaires emphasizing services provided and gum arabic production and marketing were concerned with 27 executive committees of associations and 34 village local committees. It is worth mentioning that the whole study area was found within the gum belt; therefore farm households perform the same economic activities, which combined crop farming, livestock raising and gum production. Different ethnic groups of farm households inhabiting the study area seem to be homogeneous, belong to closely interrelated tribes and exhibit similar socio-economic characteristics (IIES/IES, 1990; El Bashir, 1993; Taha, 2006). Therefore, two-stage random sampling technique was employed as a tool for selecting target villages and respondents for the purpose of the study.

Data collected from the study area were analyzed using the SPSS as well as EXCEL to obtain descriptive statistics.

3. Results and Discussion

The stakeholders involved in production and marketing of gum arabic in the two localities; Ennuhud and West Bara were identified in ranking order to include GAPAs (63%), followed by the Donors Aid Fund (33.3%) and village merchants (3.7%).

Findings revealed that selection of GAPAs executive committee has been completed via agreement and/or conformity; in spite significant differences ($p \leq 0.05$) were reported between methods of selecting such identities in the two investigated localities. The study results pointed that the majority of executive committee members (88.9%) were fully satisfied by the efforts they exerted towards providing services for their members. In spite of this finding and in line with the concluding remarks made by Elgaleem (2010) and Taha *et al.* (2014), the investigators of the current study have also observed that members of executive committee at the top of the GAPAs administration were not fully aware of their rights and responsibilities in decision making, in addition to other managerial and organizational processes, which have negatively affected the role of such associations. When asked why the GAPAs leaders were unaware of the negative impacts of their duties and responsibilities, the majority (88%) of interviewed members attributed this to the unsystematic selection procedure with respect to qualifications and merits, which was dependent mainly on direct free elections,

reconciliation and acclamation by others, and in all cases there was bias in the selection procedure. Conclusions made by Gareek (2005) have gone the same direction with regard to the negative role of the GAPAs due to organizational and administrative weaknesses, besides exclusion of the general assemblies. However, the role of GAPAs has continued to work according to its plan in the targeted areas, but so far and based on 47% of the respondents, the gum associations have not achieved efficiently the desired results in production and marketing of gum arabic in the study area. Nevertheless, the role of GAPAs in providing different services encompassing promotion of gum production and marketing, collaterals for finance and availing drinking water in the study area has been recognized by 11.8%, 32.4% and 8.8% of the respondents, respectively. As a consequence, the existence of gum associations in areas of gum production has in turn encouraged settlement of farmers, especially the young generation and made possible to open a wide horizon for working organizations to play a role (Elgaleem, 2010; Taha *et al.*, 2014).

It was found that majority (98.9%) of farmers in the study area are members of the GAPAs who were reported to be fully involved in crop farming and gum production. This result conforms to the conclusion made by Gabir (2000) who emphasized that agriculture and collection of gum arabic from *Acacia senegal* constituted the main economic activity for the bulk (95%) of inhabitants in the area. Regarding involvement of GAPAs members in agricultural and gum production activities, the responsibility of women in the study area was appreciable. The greater part (94.1%) of members of village local committees emphasized the recognizable role of women in gum collection, cleaning and re-establishment of gum stands, and to a lesser extent in gum tapping.

It was also revealed that cultivation of field crops formed the main occupation for a considerable portion (70.6%) of the targeted members of village local committees. As would have been anticipated, this implied settlement of such persons at least during the relatively long rainy season which in turn gave them ample time to deal intactly with affairs of their community members. The same finding was reached by Gabir (2000), Elgaleem (2010) and Taha *et al.* (2014) who all concluded that agriculture and production of gum arabic from *Acacia senegal* constituted the main economic activity for the majority of population in the area.

Depending on the facilities available in different parts of the study area, the services provided by each association were found to vary accordingly. The findings showed that services offered by the GAPAs for their members in the two investigated localities were mainly extension, marketing, education, midwifery, health, drinking water and provision of collaterals necessary for finance. The percentage distribution of farmers against services provided by the GAPAs as have been recognized in the two localities were estimated in respective order of 9.6%, 21.9% and 68.5% for extension, finance and marketing. Results of the analysis of variance showed significant differences ($p \leq 0.05$) between GAPAs in the two localities with regard to providing extension services

and guarantees for securing financial support. Such a finding could be attributed to unavailability and very limited accessibility of farmers to any source of finance in West Bara Locality, where no fiscal support was reported for a single association there. This adds to the very low profile of services provided by the GAPAs in this part of the study area. In contrast, farmers belonging to many GAPAs in Ennuhud Locality had the chance to secure financial support from different sources mainly the Promoting Gum Arabic Production and Marketing Project working in the area. Findings of the study emphasizing the small contribution of the GAPAs towards provision of finance and improvement of production and marketing of gum arabic in West Bara Locality were in agreement with the conclusions of Abdelraheem (2003) and Elgaleem (2010). The Cooperative Societies of Gum Arabic Producers in Sheikan and Omrowaba Localities in North Kordofan State were not efficient and services provided did not result in significant differences between members of societies compared to others with respect to production and marketing of gum arabic as well as increase of returns from sales of gum (Elgaleem, 2010).

Results of the study showed that financial support was available only for one third (33.3%) of interviewed respondents in both localities. Financial facilities were found to be unattainable for the majority (66.7%) of the respondents in the study area. With regard to sources of finance, respondents with temporary unreliable financing were belonging to the group that includes gum farmers depending on informal credit system locally known as the “*sheil*” system from village merchants as the principal source for necessary cash. They comprised only 1.1% of the respondents in the study area. While 29% of farmers had access to formal source of finance exemplified in the Promoting Gum Arabic Production and Marketing Project working in the area, a considerable portion (69.9%) was reported to rely on their own savings for supporting their production activities such as crop farming, small trades including gum. These findings were in line with the conclusions reached by Eljubaeil (2002), Mahmoud (2004) and Elgaleem (2010) who emphasized the inadequate finance available to producers in the area and consequent reduction in cultivated areas and sequentially declining production. In addition, Eljubaeil (2002) had put much attention on the lack of a clear credit policy vision, besides the strict conditions and reluctance of financing institutions to lending money to small farmers because of highly risky traditional agriculture and gum production. It is reported that there were some 12,000 gum arabic farmers in the gum belt throughout Sudan, one quarter of which were women. For instance, the women in the Sudanese village of Demira have benefited from establishing a local Gum Arabic Producers Association (Langford, 2013). The members of the association were trained in gum tapping, agroforestry, financial and organizational management. As well, Taha (2006) concluded that the majority (76.3%) of gum producing villagers in all parts of Kordofan and the Blue Nile were belonging to the category of temporarily unreliable source of finance. This adds to the minor role that Gum Arabic

Company has been playing in the gum producing areas, besides the poor infrastructure and lack of basic services (Ibrahim, 2002).

The study has identified many shortcomings associated with the ineffective role of the GAPAs to facilitating provision of collaterals for securing timely adequate financial support as has been emphasized by less than half (46%) of interviewed respondents in the study area. These constituted unavailability, insufficiency and unreliability of finance, which was always connected with inadequate/or lack of collaterals, besides the high interest rates and short payback periods.

Regarding means employed for transportation of gum crop from producing areas to markets in the study area, the two localities were proved to be significantly different ($p \leq 0.05$) with respect to the use of animals (donkeys, horses and camels) and local cars (*caros*) dragged by animals. It is worth mentioning that there is a room for the GAPAs to introduce affordable modern means of transportation available in the market. This could help very much to reduce both production costs and losses of gum arabic provided that infrastructure and roads are improved. Average expenses of transporting one kantar (44.5 Kg) of raw gum arabic from production sites to marketing centres (village/rural, urban or central markets) were estimated as 10 Sudanese pounds SDG (\$ 1.25). This would have been expected because of the very low profile of services provided by the GAPAs in the study area resulted from the administration process of such institutions.

As far as marketing of gum was concerned, the interviewed respondents were inquired to judge various marketing policies of gum crop they have experienced. The outlets available for gum farmers to sell their produce were identified to include farm gate, local village merchants and city merchants. The Gum Arabic Company (GAC) or its representatives were not there, because the study was conducted after such institution was abolished and local gum trade has been liberalized. Significant differences ($p \leq 0.05$) were reported between the two localities; Ennuhud and West Bara with respect to selling the gum produce both to local village merchants and city traders. The percentage distribution of farmers against the marketing policies they preferred for their gum crop in the two localities were estimated as 74.2%, 22.6% and 3.2% for local village merchants, city merchants and the farm gate, respectively. Such a situation encouraged middlemen and small traders to dominate gum markets and affected negatively the prices available for small farmers; this conclusion came in agreement with findings reached by Mahmoud (2004), Taha (2006), Elgaleem (2010) and Taha *et al.* (2014). Due to the relatively high marketing costs and fees imposed on gum crop, coupled with the long distances from production sites to marketing centers, poor infrastructure and transportation facilities, the farmers were reported to sell willingly their gum commodity for low prices to village and/or intermediate merchants. Such a conclusion was highlighted by Mahmoud (2004), Taha (2006) and Taha *et al.* (2014).

With respect to provision of basic societal needs and public services in terms of education, health, drinking water, and extension, it has been found that the majority (67%) of the

GAPAs members were in favor of their associations, while considerable members constituting 33% were emphasizing the ineffective role of the GAPAs in the area. Significant numbers (73.5%) of GAPAs members were used to bring drinking water using water tanks from far distant sources for high costs. The artesian wells constituted the only source of water for 17.7% of farmers in some villages and small portion (8.8%) were reported to depend on shallow hand-dug wells for their water needs. Based on viewpoints of GAPAs and local village committees, it was found that the majority (67.7%) of respondents interviewed appreciated the role of their GAPAs to facilitate provision of health services, while 82.4% of villagers acknowledged efforts of associations with regard to availability of basic education. As well, 83% of interviewees recognized the provision of trained midwives in villages. The responsibility of the gum associations with respect to availability of transport or storage facilities in the area has not been given any consideration by any one.

The results showed that shortage of drinking water was the main problem in the targeted area and constitutes a major constraint to gum production. Considerable portion of respondents (64.7%) assured that water problem received less attention from responsible agents; however 32.4% attributed the problem to the nature of the basement complex characterizing the area and only 2.9% of respondents referred the problem to technical defects related to water pump dysfunction. Although the respondents reacted differently, however, all replies attributed to the scarcity of water in the study area as the most important trouble affecting the gum production in both localities.

4. Conclusions

- The members of the GAPAs existing in the study area constituted the majority of stakeholders involved in production and marketing of gum arabic in the two localities; Ennuhud and West Bara.
- The successful role of GAPAs in providing different services encompassing extension, marketing, education, midwifery, health, and to some extent drinking water and guarantees necessary for finance in the study area has been recognized, although the members of executive committee at the top of the GAPAs administration were not fully aware of their rights and responsibilities in decision making and other managerial and organizational processes.
- The majority of the GAPAs members were in favor of their existing associations, whose role has continued to work according to its plan and in turn contributed to settlement of family members of household gum producers in the targeted areas. In spite, considerable members were stressing the ineffective role of the GAPAs towards improving production and local marketing of gum and providing basic services mainly water as well as guarantees necessary for adequate and appropriate time funding availability.
- The GAPAs did not achieve remarkable success in

improving infrastructure, logistics and storage facilities. At the same time, relatively high marketing costs and fees were imposed on gum crop, coupled with the long distances from production sites to marketing centers, in which case the producers sell readily their gum commodity to village merchants and/or middle brokers or small traders for prices lower than in perfect markets.

- Based on the successful experience of GAPAs and supporting development projects and/or organizations, particularly in Ennuhud Locality, the GAPAs are most likely expected to change the picture and reflect positively on price and encourage producers to tap gum trees and raise production efficiency.

Acknowledgements

We would like to acknowledge the support of the University of Kordofan and Forests National Corporation of Sudan for sponsoring this study. Our special thanks are due to the local communities in the gum arabic belt and Associations of Gum Arabic Producers in Kordofan Region and colleagues at the Institute of Gum Arabic Research and Desertification Studies, University of Kordofan for providing space during the write up.

References

- [1] Adam, H. E. (2010), "Integration of Remote Sensing and GIS in Studying Vegetation Trends and Conditions in the Gum Arabic Belt in North Kordofan, Sudan". PhD Thesis, TU - Dresden, Germany. ISBN 978-3-941216-58-7.
- [2] Abdelraheem, Sitana Alrasheed (2003), "Impact of Domestic Support on Provisions at World Trade Export of Gum Arabic". M. Sc. Thesis, University of Khartoum, 2003, pp 87.
- [3] Abdulgadir, Abdulmajid (2015), "Secretary General of the Gum Arabic Council". Google Earth, <http://news.sudanvisiondaily.com/details.html?rsnpid=219702>. Accessed in July 2015.
- [4] Alshareef, A. M. (1994), "West Kordofan State in lines". Administration of Range and Forages, *Alfola*, West Kordofan State, Sudan.
- [5] Anderson, D. M. W. (1993), "Some Factors Influencing the Demand for Gum Arabic (*Acacia senegal* (L.) Willd.) and other Water-Soluble Tree Exudates". In: *Forest Ecology and Management* 58: 1-18.
- [6] Care Sudan (2104), "Household Food Security, Profile of North Kordofan State, Survey Report". Care Elobiad Office-Elobiad -Sudan.
- [7] CBS, Central Bureau of Statistics (2005), "Annual Report Statistical Book", Khartoum, Sudan.
- [8] CBoS, Central Bank of Sudan (2010), "Policies of Central Bank of Sudan for the Year 2010". Monetary and Credit Policy. Khartoum, Sudan. www.cbos.gov.sd/en/node/69. Accessed in July 2015.
- [9] CBoS, Central Bank of Sudan (2012), "Economy of the Sudan. Economic Indicators of 2012 – 2016 Plan". Khartoum, Sudan. Pp21. www.central-bank.org.tt/sites/default/files/Summary%20Economic%20. Accessed in July 2015.
- [10] Dafalla, M. Elhassan (2002), "Seminar Paper on Gum Arabic Belt". Records of Forests National Corporation, North Kordofan State, Sudan. Paper No. 27, pp 9.
- [11] Elamin, E. M. and Ballal, M. E. (1989), "Paper on Land Tenure and Usufructuary Rights in the Traditional Gum Belt Agroforestry System in Western Sudan". Elobeid Research Station, Sudan, pp 12.
- [12] El Bashir, H. (1993), "Social Structure, Ethnic Relations and Land Tenure Systems in Rural Sheikan Province". Consultant Report Produced for the Area Development Schemes (ADS), Elobeid, Sudan. Pp 63.
- [13] Elgaleem, A. (2010), "The Role of Cooperative Societies of Gum Arabic Producers in Promoting Gum Arabic Production and Marketing: Case of Sheikan and Omrowaba Localities - North Kordofan State, Sudan". MSc Thesis, University of Kordofan, 2010.
- [14] Eljubaeil, Abdelmoniem M. A. (2002), "Improving Efficiency of Banking Credit for Developmental Services in North Kordofan State, Sudan". MSc Thesis, University of Kordofan, 2002, pp 114.
- [15] Elzubair, Asma E. M.; Adam, Yahia O. and Taha, M. E. (2015), "An Overview on Associations of Gum Arabic Producers in Sudan: Problems and Challenges". Value Chains – Welcome to Africa. Proceedings of the Summer-School Workshop, 10-21 March 2014, Wondo Genet/ Adis Ababa, Ethiopia. Scientific Cooperation Network on Climate Change Adaptation in Eastern Africa. ISBN 978-3-942934-05-3. www.tu-dresden.de/forst/w2a.
- [16] Forman, Stephane (2102), "Revitalizing the Sudan Gum Arabic Production and Marketing". P110588 - Report on Implementation Status and Results. Report Number ISR8088. <http://documents.worldbank.org/curated/en/2012/11/16910481/sudan-revitalizing-sudan-gum-arabic-production-marketing-p110588-implementation-status-results-report-sequence-04>. Accessed in July 2015.
- [17] Gabir, E. G. Agib (2000), "The Effect of Price Policies on Gum Arabic Production and Marketing in Greater Kordofan, Sudan". MSc Thesis, Department of Agricultural Economics and Rural Development, University of Kordofan. Pp 123.
- [18] GAC, Gum Arabic Company (1996), "Paper Presented on Problems and Constraints of Marketing Gum Arabic". Gum Arabic Conference, Friendship Hall (19 October 1996), Department of Research and Statistics, Gum Arabic Company, Paper No. 9/96, Khartoum, Sudan, pp 8.
- [19] Gareek, M. Hassan (2005), "Annual Reports and Archive Unit, Notes of Performance of Cooperatives in North Kordofan State". Note No. 16 – 2005, Ministry of Finance, North Kordofan State, Sudan. Pp 6.
- [20] Geller, Scott; McConnell, Rosalie; and Rahamtalla, Ibrahim (2009), "Linking National Forest Programmes and Poverty Reduction Strategies, Sudan". Food & Agriculture Organization, Forestry Department of Forestry Policy and Institutions Service. Rome. Italy, p 30.
- [21] GPsU, Gum Arabic Producers Union (2009), "Aspects of Gum Production and Producers Constraints". Working Paper Presented in Conference on Improvement of Services and Gum Production. Archive Unit No. 19 GAPU, Ministry of Agriculture and Livestock. North Kordofan State, Sudan, 2009, pp 5.

- [22] Harrison, M. N. and Jackson, J. K. (1958), "Ecological Classification of the Vegetation of the Sudan. *Forest Bulletin, New Series No. 2, Agricultural Publications Committee.* Khartoum, Sudan.
- [23] Hashim, M. A. (1995), "Situation and Potentials of Improving Smallholder Farming Systems in Semi-Arid Areas in Western Sudan". Doctoral Disertation, Farming Systems and Resource Economics in the Tropics Series, Vol. 21, Kiel – Germany, 1995.
www.amazon.it/Situation-Potentials-Improving-Smallholder-Semi-Arid. Accessed in August 2015.
- [24] Hunting Technical Services Ltd. (1963), "Land and Water Use Survey in Kordofan Province of the Republic of the Sudan". Doxiadis Associates, Athens.
- [25] Ibrahim, M. Abdelazim (2002), "Gum production in Africa with Especial Reference to Sudan and Emphasis on Potential for Poverty Alleviation". Workshop on Gum Arabic Production, Processing and Trade in Africa. Khartoum – Sudan. 22 – 25 April 2002.
Pp4.intranet.iucn.org/.../FNC_GumArabic_BackgroundPaper_WCC_Sept08.doc.
www.docstoc.com/docs/37089650/Gum-Arabic-Belt-Potential. Accessed in August 2015.
- [26] IFAD (2002), "Evaluating Cooperative Societies of Gum Arabic Producers". Seminar Paper, Records of Forests National Corporation, Omrowaba Locality, North Kordofan State, Sudan. Pp 8.
- [27] IFAD (2003), "Evaluating the Agricultural Season in North Kordofan State". Final Report, Records of Ministry of Agriculture and Livestock. North Kordofan State, Sudan, pp 46.
- [28] IIES & IES (1990), "Gum Arabic Rehabilitation in the Republic of the Sudan (1990)". Stage 1 Report. Volume 2. Main Report and Recommendations for Action. By: International Institute for Environment and Development, London, England and Institute of Environmental Studies, University of Khartoum, Sudan.
- [29] JECFA, Joint FAO/WHO Expert Committee on Food Additives (1997), "Supersedes Specifications Prepared at the 49th JECFA, 1997". Published in FNP 52 Add 5 (1997). C.A.S. Number 9000-01-5.
<http://www.google.com/url?url=http://www.fao.org/ag/agn/jecfa-additives/specs/Monograph1/Additive-19.pdf&rct=j&frm=1&q=&esrc=s&sa=U&ei=ZkOaVaz0AsOr-QG5go3QDw&ved>. Accessed in July 2015.
- [30] Karama, Musa Mohamed (2001), "Gum Arabic: Present Situation and Future Prospects". Department of Research and Statistics, Gum Arabic Company, Paper No. 3/01, Khartoum, Sudan, pp 13.
- [31] Khalid, Ali M. (2005), "Annual Reports and Archive Unit, Note No. 28 – 2005", Ministry of Finance, North Kordofan State, Sudan, pp 17.
- [32] Langford, K. (2013), "Sudanese Women Revive Tradition of Gum Arabic Harvesting, World Agroforestry Centre, Agroforestry News, October 16, 2013.
- [33] LGC, Local Governance Chamber (2015), Khartoum, Sudan.
- [34] Mahmoud, Tarig Elsheit (2004), "The Adequacy of Price Incentives on Production, Processing and Marketing of Gum Arabic in Sudan. A Case of North and West Kordofan". PhD Dissertation. TU Dresden, Germany. ISBN 3-9809816-4-9.
- [35] MoF, Ministry of Finance (2005), "Gum Arabic Marketing". Working Paper Presented in Conference on Improvement of Services and Gum Production. Note No. 17 – 2005, Ministry of Finance, North Kordofan State, Sudan, pp 9.
- [36] OmPsU, Omrowaba Producers Union (2005), "Explaining Executive Board Members of Producers Union". Records of Forests National Corporation, Omrowaba Locality, North Kordofan State, Sudan, pp 17.
- [37] Ramly, Fatima M. A. (2012), "Evaluating Cooperative Societies of Gum Arabic Producers". Seminar Paper No. 1, Records of Forests National Corporation, Omrowaba Locality, North Kordofan State, Sudan, pp 8.
- [38] Sahni, K. C. (1968), "Important Trees of the Northern Sudan". UNDP and FAO of the United Nations. Forestry Research and Education Centre Khartoum, Sudan, Pp. 1-7.
- [39] Salim, E. E. El zain; Hussein M.B. and Maruod E. Maruod (2014), "Impact of Agricultural Extension Activities & Socioeconomic Factors on Farmers' Adoption of Melon Bug Hand Picking In West Bara Locality North Kordofan State, Sudan". *International Journal of Education and Research*. Vol. 2 No. 10 October 2014.
- [40] Sudanet (2015), "Facts on Sudan; Agricultural Development in Sudan; Geography and Topography of Sudan".
<http://www.sudan.net/about.php>. Accessed in July 2015.
- [41] Taha, Mohamed El Nour (2006), "The Socio-Economic Role of *Acacia senegal* in Sustainable Development of Rural Areas in the Gum Belt of the Sudan". PhD Thesis, TU Dresden, Germany, ISBN 3-9809816-6-6.
- [42] Taha, M. E.; Tsegaye, B. and Elgaleem, A. (2014), "The Role of the Cooperative Societies of Gum Arabic Producers in Promoting Gum Arabic Production and Marketing in North Kordofan State, Sudan". In the *International Journal of Agriculture, Forestry and Fisheries*. Vol. 1, No. 1, 2013, pp. 11-16.
- [43] Twinklesoft (2012), "Softwaer Informer, Easy Samlpe and File Decription Database".
<http://twinklesoft.software.informer.com>. Accessed in July 2015.
- [44] USAID (2012), "Sudan Environmental Threats and Opportunities Assessment with Special Focus on Biological Diversity and Tropical Forest". Sudan Integrated Strategic Plan (ISP). Publication produced for Review by the United States Agency for International Development. Prepared by Suad Badri, Management Systems International. Pp 73.
- [45] WFP, World Food Program (2103), "Comprehensive Food Security Assessment". Conducted in North Kordofan by State Ministry of Agriculture with Support from WFP Sudan, August 2013.
<https://www.wfp.org/content/sudan-comprehensive-food-security-assessment-north-kordofan-august-2013>. Accessed in August 2015.