



Research Article

Trends in production and export of Gesho/Rhamnus prinoids in Ethiopia

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Rhamnus prinoids is a multipurpose crop as its all parts harvested and utilized. The study was conducted to analyze the trend of production and export of Rhamnus prinoids in Ethiopia. Secondary data on production and export of the crop were used and analyzed using descriptive statistics. The study identified the total hectare of land under Rhamnus prinoids production and the total volume of production has increased with a compound growth rate of 3% and 4% respectively; while the productivity of the crop has shown no change. Ethiopia exports on average 371,091 kg of Rhamnus prinoids and incurred birr 8,250,427. Israel and Sudan were the highest volume recipient countries for Ethiopian Rhamnus prinoids with the percentage share of 22 % and 72 % respectively. Great Britain was the destination country from which highest value/kg (birr 322/kg) from Rhamnus prinoids export is received. Therefore, it is important to give attention to the crop in incorporating it into the research system so as to have improved varieties and agronomic recommendations. On the other hand, we need to export the crop and its product to those countries which have high VVR.

Keywords: Gesho, Value to volume ratio, Ethiopia, Rhamnus prinoid

INTRODUCTION

Ethiopia being an agrarian economy is endowed with several plant species. Despite such natural endowment, much of the plant species remained underutilized. Rhamnus prionoides locally known as Gesho is one of the most underutilized plant species that have high social and economic importance in many rural and urban communities of Ethiopia. Rhamnus prinoides, (Gesho) belonging to the family Rhamnaceae is a shrub and can grow up to 8m high. It economically important shrub and is cultivated in a wide range of ecological areas even in the wild in all provinces, in many gardens near houses and sometimes as a field crop on a larger scale across the country (IBC, 2012; Jansen, 1981). In Ethiopia, all parts of the plant Rhamnus prinoids are harvested and utilized for different purposes. According to (CSA, 2015/16) meher season 371,622 quintal of Rhamnus prinoids has been produced and from these, a total of 56

quintals was utilized for household consumption while, 0.66 quintal, 41.64 quintal, 0.11 quintal, 0.01 quintal and 1.53 quintal was utilized for seed, sale, wages in kind, animal feed and others.

Economically the leaf of Rhamnus prinoids is used for consumption mainly as an additive in brewing local beverages i.e traditional homemade alcoholic drinks including tella, katikala and tej. The leaves and steams of Rhamnus prinoids are indispensable ingredients in the making of these traditional fermented beverages (Susanne, V. 1997; Berhanu M. etal, 1995; Haimano, t A. 2011). It can be also used as a substitute to the standard commercial hops for beers brewed for commercial purpose as its total resin, soft resin, hard resin and essential oil is comparable with that of the commercial verities of hops (Berhanu, A. 2014). Moreover it has got

traditional medical values to relieve pain and as perennial crop ground cover, is important for soil protection against wind and water erosion (M.I Zuberi et.al., 2014).

Furthermore, studies revealed that, as a perennial crop it does not require high labor inputs every planting season, secondly it offers relatively high yield and incomes per unit area of land not only by itself but also in terms of suitability for inter cropping which allows for even more lucrative use of land especially in mountain areas (Susane, V. 1997)

Unlike many plant species that have social and economic importance, Rhamnus prinoids has been given little attention by research and development organizations in the country. This has led to less developed value chain and limited market opportunities. In this regard information available about Rhamnus prinoids production and marketing is very scant which could be attributed to limited emphasis given to it. This study was therefore generally aimed at generating information about Rhamnus prinoids production trend in the country and export value the country is generating from Rhamnus prinoids trade in the international market.

The findings of the study will help planners and policy makers understand the importance of Rhamnus prinoids in terms of export value the country is earning and overall trend in production, and justify the need to invest in Rhamnus prinoids research and development. The study has two operational objectives to achieve; 1) analyze the trend in production and yield and 2) analyze the trends in export volume and value of Rhamnus prinoids in the international market.

DATA

Time series data that cover a period of 22 years (1993 to 2014) were used. Data on production, area coverage and yield were obtained from FAOSTAT (2014) and the export volume and value of Rhamnus prinoids were obtained from Revenue and Custom Authority of Ethiopia. The export volume and value data collected from Revenue and Custom Authority of Ethiopia represents national level volume of Rhamnus prinoids exported and the revenue the country has generated from its export. The specific feature of the data obtained from Revenue and Custom Authority of Ethiopia is that it is reliable and free from estimation error had as it is obtained from direct recording of data registry which captured every transaction in Rhamnus prinoids export.

EMPIRICAL ANALYSIS

The analysis of this study is based on different econometric models and descriptive statistics. Semi-log trend function was fitted to the data following the procedure of Gujarati to find out the trend and estimate the growth rate of production, area and yield and also the

volume and value of the export of Rhamnus prinoids in Ethiopia.

If y_t denotes the observation (e.g. agricultural production, productivity, or area) at time t and r is the compound growth rate, model employed for estimating r is based on $y_t = y_0 (1 + r)^t$ eq1

The usual practice is to assume a multiplicative error-term $\exp(\epsilon)$ so that the model may be linearized by means of logarithmic transformation,

$$\ln y_t = a + bt + e \dots \dots \dots \text{eq2}$$

Where, $a = \ln(y_0)$, and $b = \ln(1 + r)$. eq.2 is then fitted to data using "method of least squares" and goodness of fit is assessed by the coefficient of determination R^2 . Finally, the compound growth rate is estimated by, $r = \exp(b) - 1 \dots \dots \dots \text{eq3}$

RESULTS AND DISCUSSION

Trends in production, area and yield

The total area of land under Rhamnus prinoids production and total volume of production has been growing over years. It is found that the major source of increase in the total production of Rhamnus prinoids has been totally resulted from increase in area of land allocated for its production, implying that the contribution of productivity to total production was null (Table 2 and 3). This is attributed to lack of productivity enhancing technologies as Rhamnus prinoids has received limited or no attention by the country's research system.

The total area of land under production has been reached 28,386 ha in 2014 from 14,500 ha during 1993 (Table 1). Production showed an increase from 15,000 tons in 1993 to 32,215 tons in 2014. Highest production registered during the year 2007 which was about 32,361 tons. On the other hand, for the first three consecutive years the crop was not showing any change in quantity produced. But a positive annual percentage change has been registered in the production of the crop Rhamnus prinoids except during 2002, 2005, 2008, 2010 and 2012. And also a positive annual percentage change has been registered in area, except in 1994, 2001 and 2008 to 2010.

But the productivity of Rhamnus prinoids does not show any significant change from year to year, even though the area as well as the production of the crop increases significantly with a compounded growth rate of 3% and 4% respectively (Table 3). Among the possible explanations could be lack of important technologies that assist to develop the production and productivity of Rhamnus prinoids. The growth in production comes from the increase in area only. A unit increase in area brings about a 1.344 ton increase in production (Table 2). The

Table 1. Annual percentage change in area, production and yield

year	Total area in ha	Annual percentage change in area	Total production in tone	Annual percentage change production	Yield (tone/ha) in	Annual percentage change in yield
1993	14,500		15,000		1.0	
1994	14,341	-1	15,000	0	1.0	0
1995	14,500	1	15,000	0	1.0	0
1996	15,000	3	16,000	7	1.1	0
1997	16,000	7	17,000	6	1.1	0
1998	18,000	13	19,000	12	1.1	0
1999	19,000	6	20,000	5	1.1	0
2000	21,000	11	23,000	15	1.1	0
2001	18,448	-12	24,651	7	1.3	0
2002	20,000	8	24,000	-3	1.2	0
2003	20,792	4	24,920	4	1.2	0
2004	21,943	6	26,050	5	1.2	0
2005	22,891	4	22,780	-13	1.0	0
2006	23,778	4	24,053	6	1.0	0
2007	25,214	6	32,361	35	1.3	0
2008	24,409	-3	30,281	-6	1.2	0
2009	23,998	-2	30,938	2	1.3	0
2010	21,669	-10	28,086	-9	1.3	0
2011	22,564	4	28,901	3	1.3	0
2012	22,945	2	21,792	-25	0.9	0
2013	24,726	8	30,588	40	1.2	0
2014	28,386	15	32,271	6	1.1	0

Authors calculation based on data from FAOSTAT

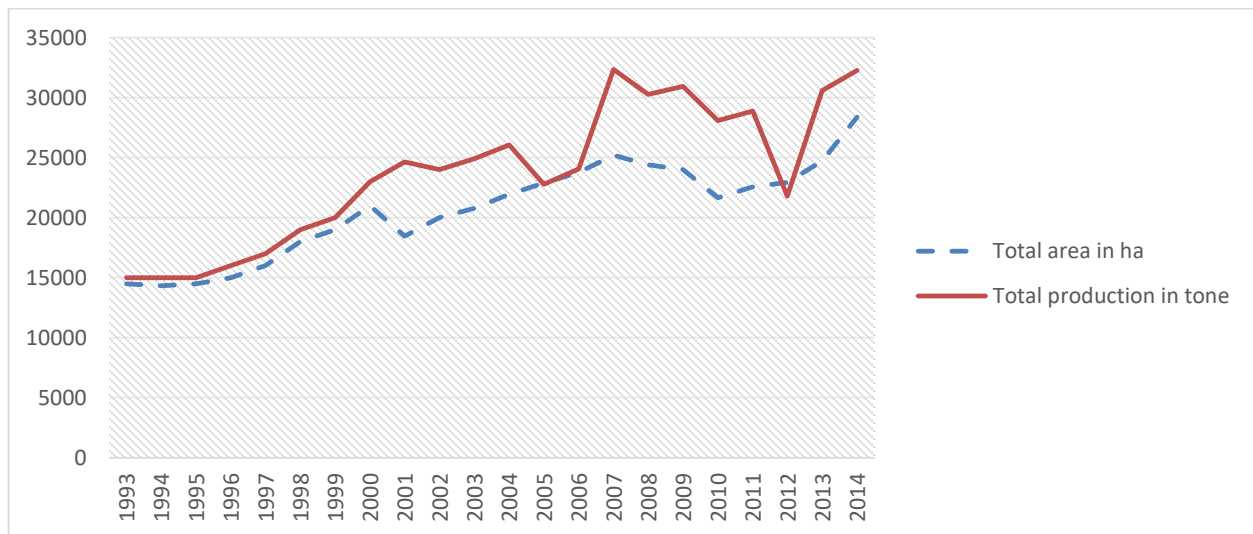


Figure 1. Trend in Land area coverage and total volume of Rhamnus prinoids Production

Table 2. Regression analysis: to test the dependency of production on area of Rhamnus prinoids

Constant Value	Regression coefficient	t-value	P(T<=t) two tail
-4024	1.344	10.169	0.000

Table 3. Growth rate in area, production and yield of Rhamnus prinoids

	Area	Production	Yield
CAGR	3	4	-

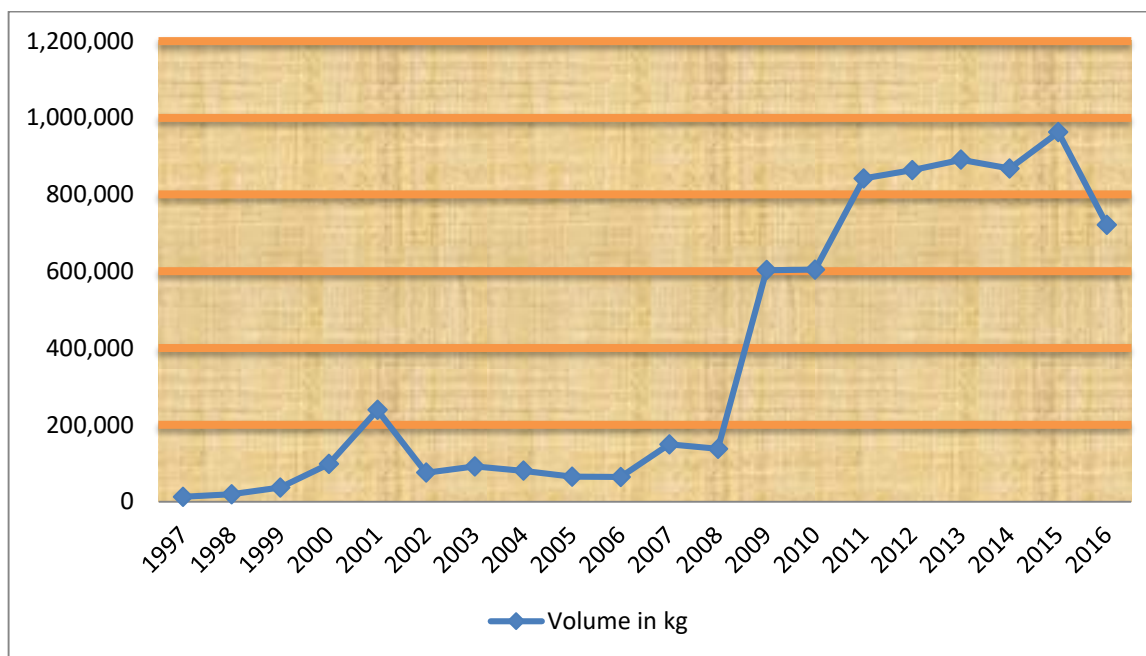


Figure 2. Trends in total volume of Rhamnus prinoids

annual percentage change in yield was zero throughout the study period.

Both total production and area allocated for the production of Rhamnus prinoids has shown increasing trend during the last 20 years (Figure 1). Increase trend in total volume of production indicate growing importance of Rhamnus prinoids in the economy as increasing amount of land has been shifted to the production of Rhamnus prinoids. Land committed for the production of Rhamnus prinoids has steady growth unlike total volume of production which has exhibited significant fluctuations over years.

REGRESSION ANALYSIS

The simple linear regression functions were fitted for estimating the response of production of Rhamnus prinoids due to the change of its respective area. And productions of Rhamnus prinoids were significantly increased. The coefficient of production on area was 1.344 (Table 2).

GROWTH RATE

Table 3 shows that the area and production of Rhamnus prinoids have a significant (significant at 1%) positive trends of 3 percent and 4 percent per annum over the study period respectively. while yield does not show a significant change or trends.

Trends in export volume and value of Rhamnus prinoids

Ethiopia has been exporting some quantities of Rhamnus prinoids to various parts of the world since 1997. fig 3. shows exports of Rhamnus prinoids from 1997 to 2016. The period under analysis opened with low volumes of Rhamnus prinoids exports and this followed by substantial increase in volume of Rhamnus prinoids exports. The last 9 years trend in the volume of Rhamnus prinoids and Rhamnus prinoids products has been increasing steadily. In 1997, the total quantity of Rhamnus prinoids exported from Ethiopia to Israel and Great Britain was 12,270 kg. From these 12,205 kg was

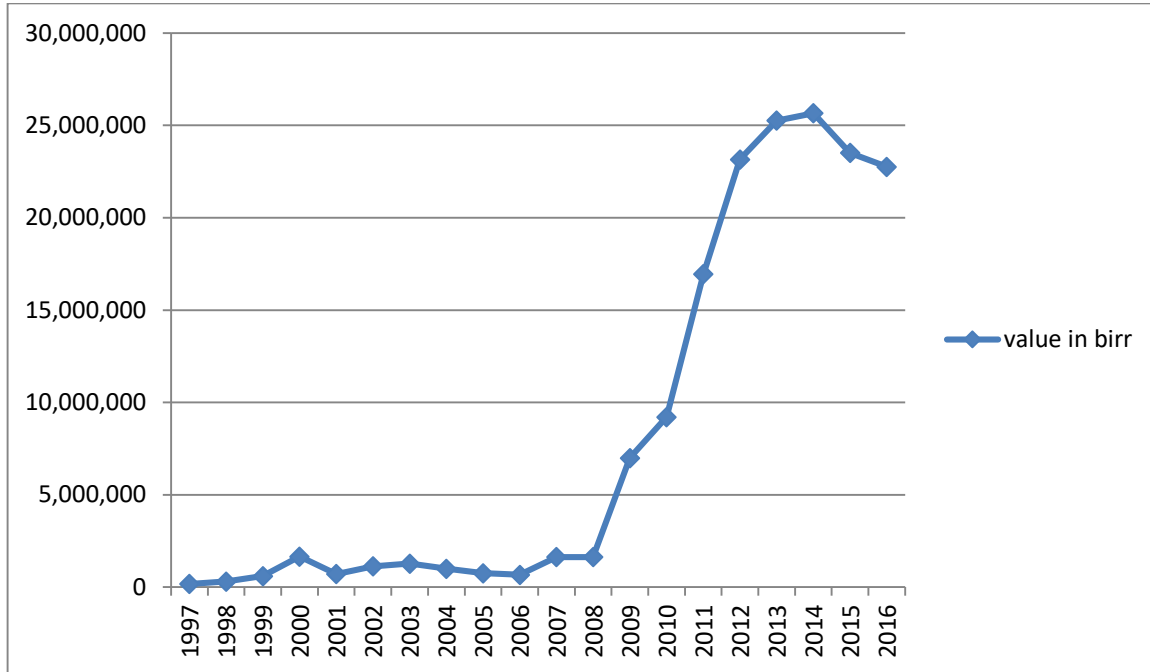


Figure 3. Trends in total export value of Rhamnus prinoides

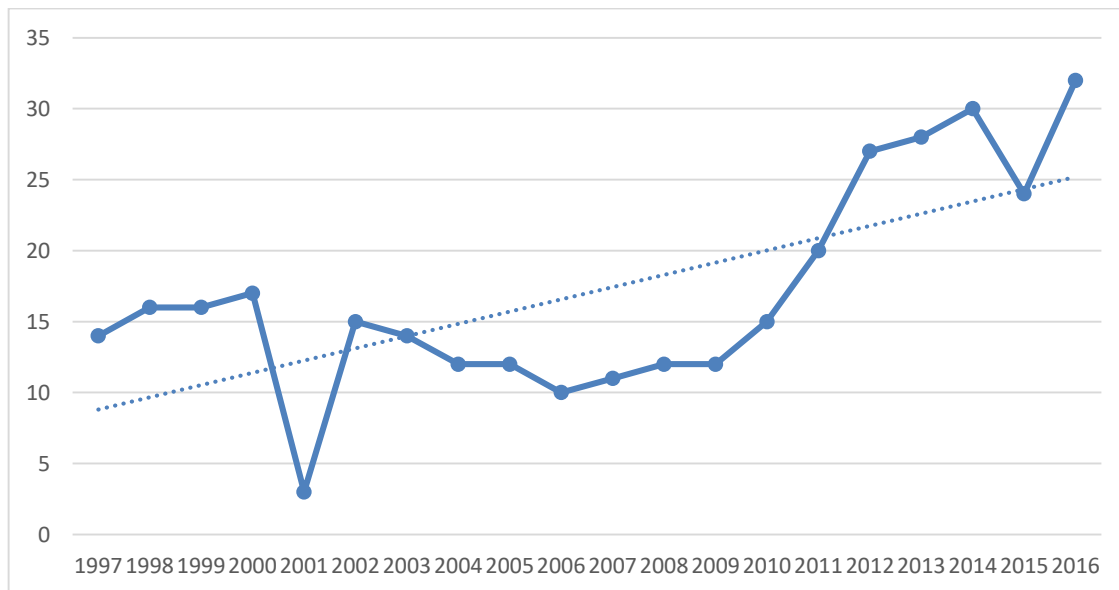


Figure 4. Trend in VVR

exported to Israel and incurred about 172,224 birr. And after some fluctuations it increased to 238,762 kg during 2001 and reached its climax 962,418 kg in 2015. Ethiopia is exporting Rhamnus prinoides cones, ground, powdered, Rhamnus prinoides sticks, fresh and dried Rhamnus prinoides leaves. And this indicates that, value added products of Rhamnus prinoides has been exported to different countries in the world, so small micro enterprises and others interested body can engage in the production as well as processing of Rhamnus prinoides.

In terms of value, the period under analysis opened with low values of Rhamnus prinoides exports and this was followed by substantial increase in value of Rhamnus prinoides exports. The export value was 173,032 birr in 1997 and reached its climax during 2014 which was 25,658,382 birr (Fig 3). The period under review closed with relatively high export values of Rhamnus prinoides. The trend in value of Rhamnus prinoides export was generally increasing steadily. And this shows that Rhamnus prinoides was becoming an important crop in the

Table 4. Trends in Value to Volume ratio (Birr/kg)

Year	Total Volume	Total Value	VVR
1997	12,270	173,032	14
1998	19,118	301,259	16
1999	36,455	596,018	16
2000	97,912	1,654,094	17
2001	238,762	712,864	3
2002	75,455	1,126,911	15
2003	91,574	1,277,576	14
2004	80,383	992,043	12
2005	64,955	752,485	12
2006	63,938	666,707	10
2007	149,236	1,628,558	11
2008	137,553	1,627,335	12
2009	603,011	6,991,325	12
2010	604,265	9,210,800	15
2011	841,884	16,947,084	20
2012	863,510	23,155,587	27
2013	890,838	25,264,687	28
2014	867,854	25,658,382	30
2015	962,418	23,516,646	24
2016	720,424	22,755,137	32
Average	371,091	8,250,427	17

Authors calculation based on data from FDRE Revenue and Customs Authority

international market, so Ethiopia can get an advantage from the crop.

Trend in Value-to-volume ratio (VVR) for exported Rhamnus prinoids

The trend in the export value-to-volume ratio (VVR) is an indicator of whether the product is either gaining or losing value from movement in world prices. It gives an indication of the extent to which the product can be considered a relatively high-value export. In other words, VVR is the amount of local currency earned from a kilogram of export item over time and calculated by dividing total value in birr by total volume in kilogram of the export item.

From fig2. we can reveal that, the VVR for exported Ethiopian Rhamnus prinoids has shown increasing trend during the study period. As a result of this the volume of the exported Rhamnus prinoids and Rhamnus prinoids products has been increasing steadily. Therefore the country can be benefited with the crop in the international market.

On the other hand, from Table 4 we can see that the average VVR for exported Ethiopian Rhamnus prinoids

during the study period has been birr 17/kg. The highest VVR in exporting Rhamnus prinoids from Ethiopia was birr 32/kg during 2016, whereas the least VVR of birr 3/kg was registered during 2001.

Major Export Destinations of Ethiopian Rhamnus prinoids

The exports destination countries are summarized on table 5. The VVR for each destination country is also provided which help us compare countries based on the VVR and made decision which country can provide beater advantage for Ethiopia's Rhamnus prinoids. Accordingly, the countries for which Ethiopia's Rhamnus prinoids has been exported includes Israel, Burundi, Hong Kong, South Africa, Spain, Sudan, Sweden, Swaziland, Great Britain, United States, United Arab Emirates, Djibouti, Iceland, Albania, Canada, Greece, Germany, Italy, United Kingdom, Netherlands, Australia, Switzerland, Norway and China.

Israel and Sudan was the highest volume recipient countries for Ethiopian Rhamnus prinoids with the percentage share of 22 % and 72 % respectively. The total volume of export destined to Sudan during the study

Table 5. Export Destinations of Ethiopian Rhamnus prinoids

Destinations	Volume	Value	VVR
Albania	100	13,084	131
Australia	2,259	95,137	42
Burundi	30	13,266	442
Canada	12,220	290,177	24
China	10	500	50
Djibouti	236,200	606,809	3
Germany	926	56,889	61
Great Britain	165	53,100	322
Greece	100	1,735	17
Hong kong	50	15,217	304
Iceland	5,590	119,306	21
Israel	1,627,631	32,338,702	20
Italy	1000	13,061	13
Netherlands	32	1,927	60
Norway	369	68,971	187
Soth Africa	15	984	66
Spain	50	1,282	26
Sudan	5,354,567	126,756,889	24
Swaziland	20	429	21
sweden	153	4,717	31
Switzerland	126	3520	28
UAE	65,985	985,190	15
UK	3,743	101,310	27
United states	110,516	3,515,163	32

Authors calculation based on FDRE Revenue and customs Authority

period was 5, 354, 567 kg and the total volume exported to the second large recipient country Israel has been 1,627,631 kg.

Burundi, Great Britain, Hong Kong, Norway and Albania were the destination countries from which highest VVR from Rhamnus prinoids export is received. Ethiopia earn birr 442/kg, birr 322/kg, birr 304/kg, birr 187/kg and birr 131/kg from export of Rhamnus prinoids to Burundi, Great Britain, Hongkong, Norway and Albania respectively. While, the rest of major export destinations exhibited lower VVR.

The export value of 1kg of Rhamnus prinoids per kg for export destined to largest recipient country of Ethiopian Rhamnus prinoids export- Sudan was birr 24 and that of Israel was birr 20. This implies that Ethiopia is exporting much of its Rhamnus prinoids to countries provide lowest VVR, implying that the country is losing advantage in the international market.

CONCLUSION AND RECOMMENDATION

The area and production of Rhamnus prinoids in Ethiopia shows a significant compounded growth rate of 3 percent and 4 percent respectively while, the productivity does not show any significant change from year to year. The annual percentage change of the yield of the crop Rhamnus prinoids in Ethiopia was almost zero during the study period.

It is found that the major source of increase in the total production of Rhamnus prinoids has been totally resulted from increase in area of land allocated for its production, implying that the contribution of productivity to total production was null. From this we can conclude that, the crop has no research support in developing improved varieties and agronomic recommendations. So, it is better if the concerned body give attention to the crop taking into account its diversified importance.

On the other hand, the export volume of Rhamnus prinoids

from Ethiopia during the study period was about 371,091 kg on average. And also, the average value Ethiopia incurred in exporting Rhamnus prinoids during the study period was 8,250,427 birr. If we take the look at the trends in value to volume ratio of Ethiopian Rhamnus prinoids during the study period, it exhibited its maximum VVR of birr 32/kg during 2016, whereas a minimum VVR of birr 3/kg in 2001. Burundi was the destination country from which highest value/kg (birr 442/kg) from Rhamnus prinoids export was received.

In terms of volume, Israel and Sudan were the highest volume recipient countries for Ethiopian Rhamnus prinoids and Rhamnus prinoids products with the percentage share of 22 % (1,627,631 kg) and 72 % (5,354,567 kg) respectively. But the export value of 1kg of Rhamnus prinoids per kg for export destined to largest recipient country of Ethiopian Rhamnus prinoids export-Sudan was birr 24 and that of Israel was birr 20 which indicates us that, we are losing the advantage in the international market.

Ethiopia is exporting large proportion of its Rhamnus prinoids and Rhamnus prinoids products to countries that provide lowest VVR. In order to enhance the revenue the country generate from its Rhamnus prinoids production countries that provide higher VVR has to be targeted.

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