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## The Role of the Libyan Agricultural Sector in the Development: An Analytical Study

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### ABSTRACT

The Libyan agriculture sector shared only (0.7 – 1.1%) of the total Libyan GDP during the period of 2000 - 2018. The highest ratio recorded in 2000 and 2005 gaining 1004.4 and 1268.5 USD millions. the crop land area ranged between (2,050,000 – 2,150,000 ha) during the period 2000 – 2018. The percentage of area equipped for irrigation in land area ranged (2.6 – 3.0%). The area of agriculture land ranged (15,350,000 – 15,450,000 ha) during the same period. While the area of forest land recorded (217,000 ha). The total percentage of workforce in agriculture sector ranged between (18.4 – 24%). The percentage of women share in agriculture employment recorded (35.9 – 40.8 %) of the total agriculture workforce. the percentage of gross fixed capital formation (agriculture, forestry and fishing) as a share of value added recorded (6.9 -15.7%). the pesticide use recorded (0.51 – 1.34 kg/ha) during the period 2000 - 2018. the total consumption of chemical fertilizers ranged (8.3 -25.6 kg/ha). Fruits recorded the highest amount of the total agriculture production (696,000 tons) followed by vegetables (682,000 tons). the total agriculture production recorded (2,210,000 tons) in 2018. The total food exports, 2018 recorded (43 USD millions), fish recorded the highest value (36 USD millions) followed by fruits and vegetables (6 USD millions). The total food imports recorded (3167 USD millions), cereals recorded the highest value (975 USD millions) followed by dairy (420 USD millions). Wheat recorded the highest amount among cereal crop imports (1461.8 thousand tons) followed by maize (784.3 thousand tons) and rice (101.2 thousand tons).

### INTRODUCTION

Libya is comprised of three main provinces: Tripolitania, Cyrenaica and Fezzan (Sunderland & Rosa 1976). Tripolitania is the northwestern corner of the country including the Nafusah Plateau. Cyrenaica, the largest geographic region, represents the entire eastern half of the country including the Jabal al Akhdar, and Fezzan is a desert land, including the Sahara Desert (Hegazy *et al.* 2011). On the other hand, Libya was divided into four geographic regions, according to the climatic characteristics, the Coastal Plains run along the Mediterranean Sea and experience dry summers and relatively wet winters, the Northern Mountains, which border the Coastal Plains, include Jabal Nafusah in the west and Jabal Al Akhdar in the east, which characterized by the greater rainfall and lower temperatures, the Internal Depressions, located in the center of Libya, is where pre desert and desert climatic conditions prevail, and the Southern and Western Mountain Range characterized as an area with little annual rainfall (Alldrissi *et al.* 1996; Laytimi 2005).

The agricultural sector in Libya is one of the important productive sectors and the tributaries of economic and social development for its important role in the employment of agricultural labor (Al-Samaa, 2014) because agricultural labor is one of the productive resources for the advancement of agricultural production and the higher productivity can be ensured by adopting technological innovations and making optimum utilization of the human resources (Tiwari, 2000) and

the natural resources cannot be utilized in the absence of labor (Vengedasalam and Madhavan, 2010).

The Libyan agricultural sector is constrained by the lack of arable land, uncertainty in rainfall and limited source-to-farm irrigation systems, combined with a poor enabling environment for private-sector driven agribusiness development (EC-Trade, 2009). Although agriculture constitutes only 2-3% of GDP, while it was 25% before the oil boom started. Not more than 3% of the exports is agricultural produce, the rest are oil products (WFP/FAO, 2011). A total of 75% of the food is imported, such as 1.5 million tons of wheat (or 80% of the wheat consumption) (CERA, 2006).

The mismanagement of environmental resources has significantly exacerbated the region's primary environmental problem of desertification. Before 2010, the government played a significant and obvious role in creating regulations that governed the use and management of agricultural lands. Act No. 15 of 1992, which criminalized the violation of agricultural lands, soil, plants, and trees, was one such piece of legislation. In order to prevent desertification and preserve the environment, the Act also outlawed all construction on agricultural fields, whether it was for the state or for private persons. However, recently, the state has not participated in anti-desertification initiatives because of the ongoing violence in the nation. (FAO, 2017).

In accordance with the NEPAD initiative and its Comprehensive Program for Agricultural Development (CAADP), Libya has recently started economic reforms

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and reinvigorating agricultural policies to conserve and efficiently use natural resources, enhance agricultural productivity, and improve the incentive structure in farming. However, due to restricted technical capabilities and a lack of information needed for policy assessments, the creation of solid agricultural policies as well as their implementation and monitoring are severely hampered. (FAO, 2011).

Libya facing serious problems of soil desertification and loss of plant canopy (Abagandura *et al.* 2010). Human activities including grazing and pastoral over-use has caused a significant soil desertification (Gebril and Saeid 2012). One of the reasons causing desertification in Libya is the poverty of Libyan flora and the short duration of weed cover (Saad *et al.* 2011). In the past, several measures were taken to address soil erosion including, storm water capture and retention on sloping agricultural land, establishing windbreaks, and the use of crop rotations (Saad and Shariff, 2011).

There are several reasons for Libya to advance sustainable agriculture. During the Gadhafi era, Libya's regime targeted numerous objectives for agricultural development, including: increasing production to improve food security; improving management of natural resources, such as water and soil management; increasing agriculture's contribution to the GDP; creating permanent jobs in the agribusiness sector; providing good infrastructure in the country's sparsely populated areas; and locating reliable sources of agricultural industrial materials and technologies, among others. In light of the current situation, each of these objectives remains essential (Lariel, 2015).

Therefore, the present study to focused on developing a strategy for an advanced agriculture policies of all agribusiness equipment's such as storage and education system that functions with available resources such as pesticides, fertilizers, water, and technology.

Agriculture in Libya is primarily dependent on underground aquifers for its irrigation needs (Alghariani 2002). Since groundwater withdrawal exceeds natural aquifer replenishment, Libya initiated a cooperation

program with neighboring countries aimed at the adoption of a long-term strategy for managing shared water resources (Salem 2007). This includes exchange of information related to the present and future withdrawals, along with water level and water quality monitoring data, and species selection. For example, by identifying crops that require less water, the country that is able to reduce the irrigation demand (El-Asswad 1995).

A few researchers have studied the statistical data of the global farm work about the Libyan agriculture sector, so the present study points a spot of view on statistical data conducted by the UN organizations to enhance the Libyan researchers and decision makers to create advanced agribusiness policies and the required measurements.

### Data Collection

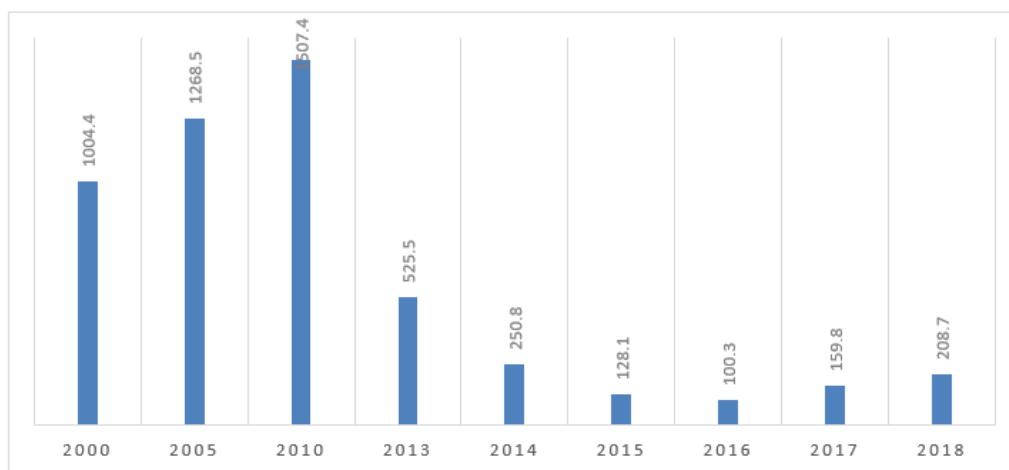
Data were harvested from the FAO reports (2000 – 2023), the UN reports and other related global farm work in Libya.

### RESULTS

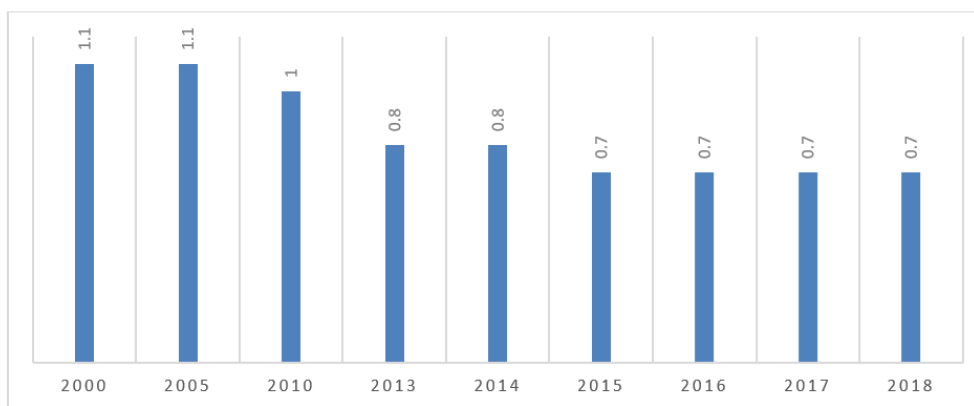
The present study was commissioned to evaluate Libya's agricultural sector among the current political and economic challenges. The most dominant challenges in Libya include soil degradation and the low quality of irrigation water sources in addition to the lack of permanent agriculture and water resources strategies. Moreover, the lack of advanced research plans and protection policies of agriculture product producers play an important role in the current difficult circumstances. So an advanced scientific and political solutions should have place. furthermore, Cooperation with international organizations to address these challenges should be occurred and activated.

### Share of Agriculture Sector of the Total Libyan GDP

As presented in figs (1 and 2) the agriculture sector shares only (0.7 – 1.1%) of the total Libyan GDP during the period of 2000 - 2018. The highest ratio recorded in 2000 and 2005 gaining 1004.4 and 1268.5 USD million dollars.



**Figure 1:** Value added of agriculture, forestry and fishing (USD million, 2015 prices) (FAO statistical year book 2020).

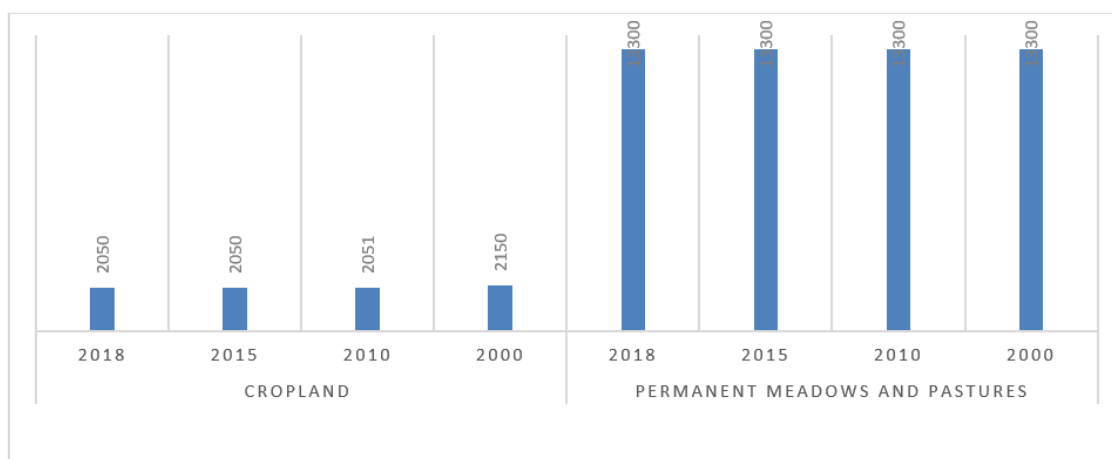


**Figure 2:** Share of agriculture, forestry and fishing value added in total GDP (USD 2015 prices) (percent). (FAO statistical year book 2020).

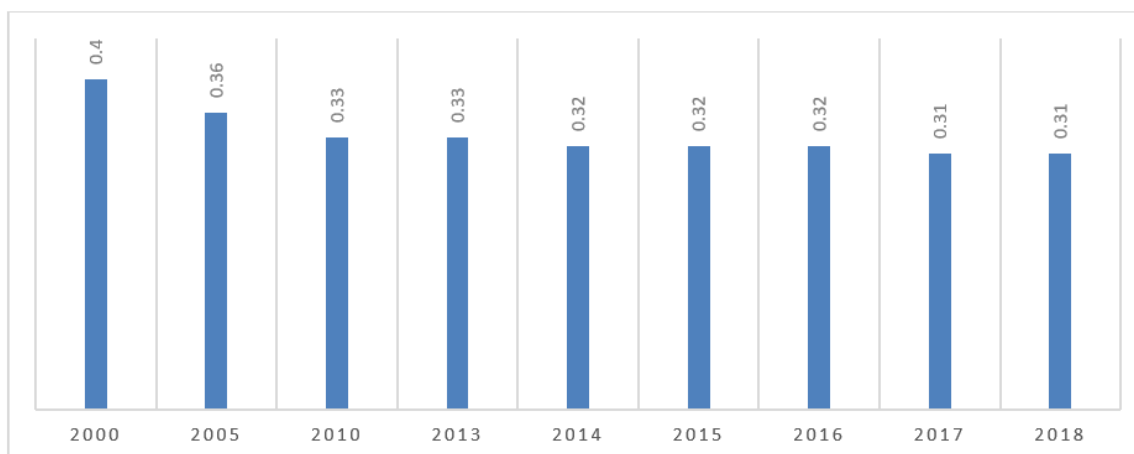
### Agricultural Land and Irrigation Equipment

As shown in figs (3, 4, 5, 6 and 7) the crop land area ranged between (2,050,000 – 2,150,000 ha) during the period 2000 - 2018 while the prominent meadows and pastures recorded 3300000 ha during the same period. On the other hand, the per capita crop land ranged (0.31 - 0.4 ha). The area equipped for irrigation ranged

(400,000 – 470,000 ha) during the period 2000 – 2018. The percentage of area equipped for irrigation in land area (2.6 – 3.0%). The area of agriculture land ranged (15,350,000 – 15,450,000 ha) during the period 2000 – 2018. While the area of forest land recorded (217,000 ha) during the same period.



**Figure 3:** Agricultural land by use (thousand ha). (FAO statistical year book 2020).



**Figure 4:** Cropland area per capita (ha per capita) (FAO statistical year book 2020).

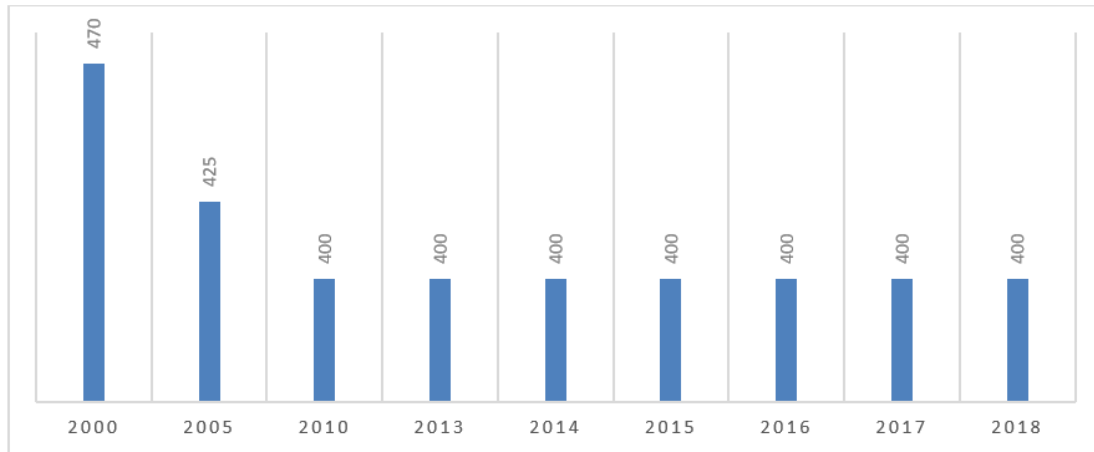


Figure 5: Area equipped for irrigation (thousand ha) (FAO statistical year book 2020)

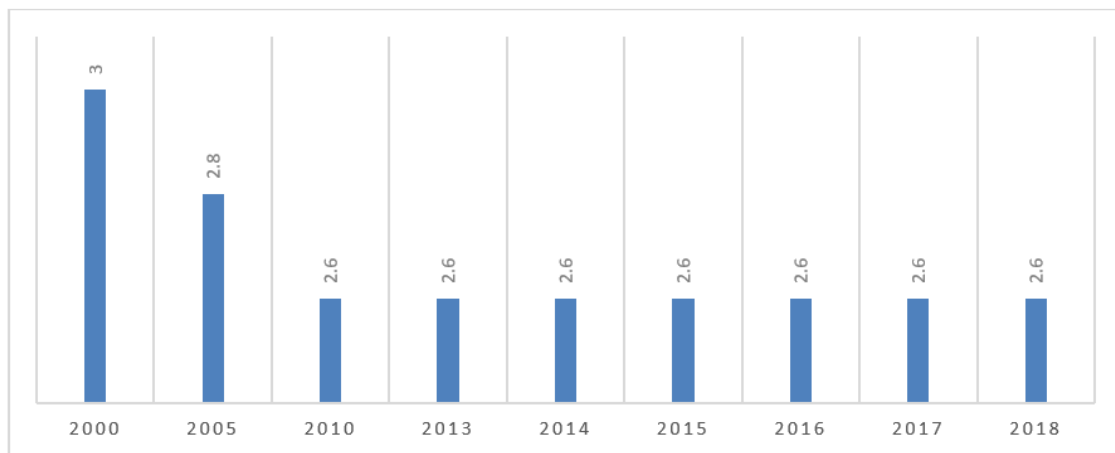


Figure 6: Share of area equipped for irrigation in land area (percent) (FAO statistical year book 2020).

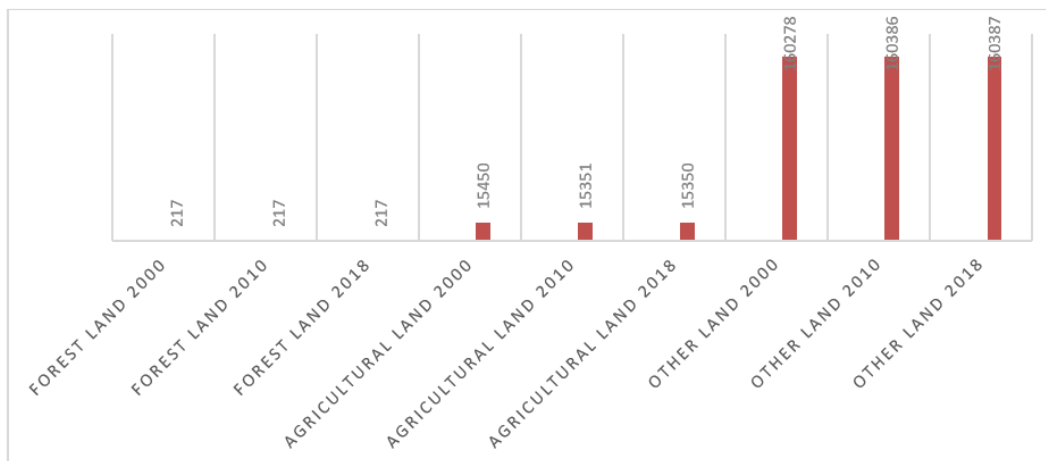
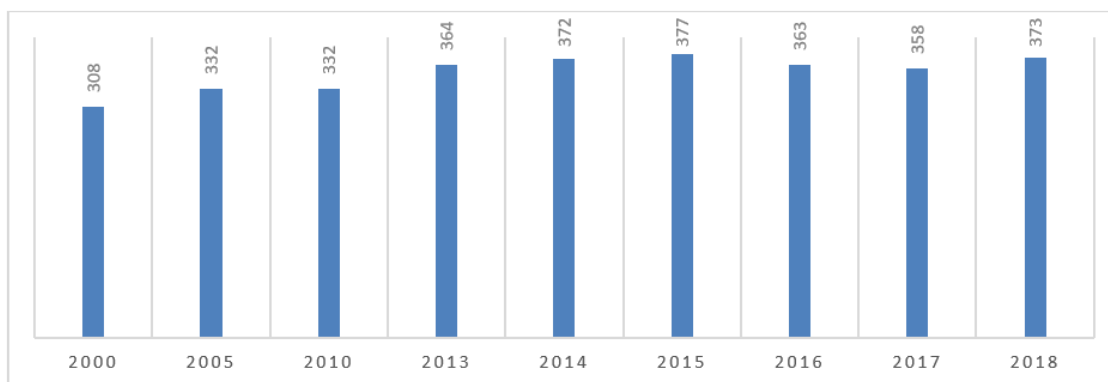


Figure 7: Land area by type (thousand ha) (FAO statistical year book 2020)

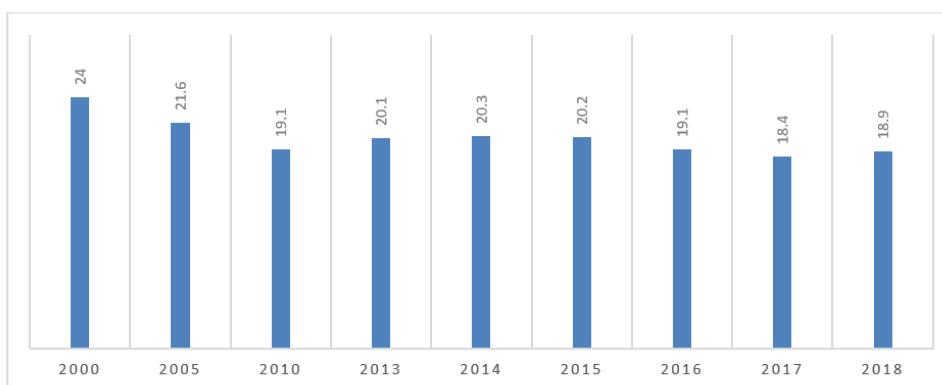
### Employment and Workforce in Agriculture Sector

As presented in figs (8, 9, 10 and 11) the total workforce in agriculture sector in Libya ranged between (332000-377000) workers with a percentage of total Libyan employments (18.4 – 24%). The women share in

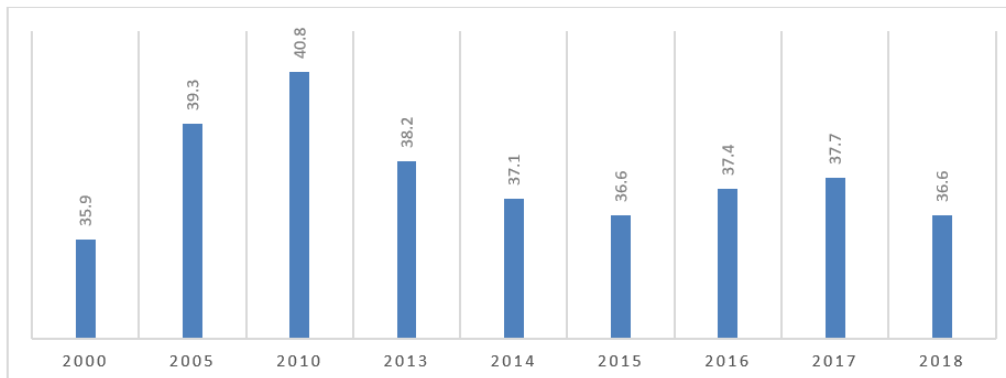
agriculture employment recorded (35.9 – 40.8 %) of the total agriculture workforce during the period of (2000 – 2018). On the other hand, the percentage of gross fixed capital formation (agriculture, forestry and fishing) as a share of value added recorded (6.9 -15.7%).



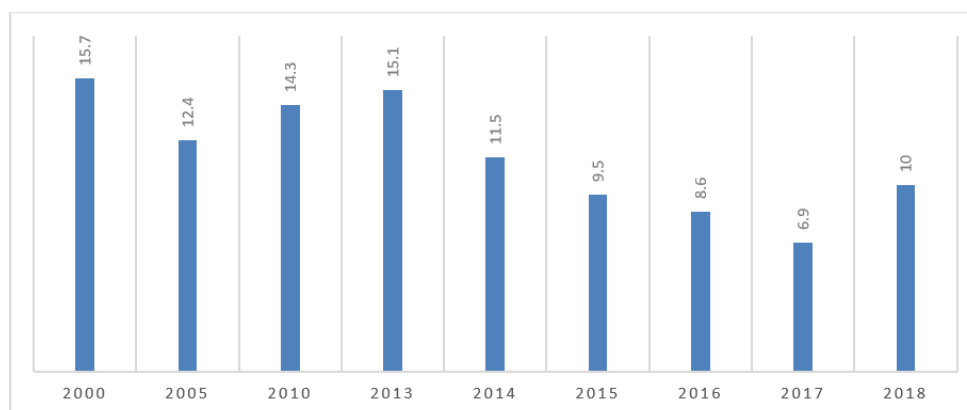
**Figure 8:** Employment in agriculture (thousand people) (FAO statistical year book 2020)



**Figure 9:** Share of agriculture employment in total employment (percent) (FAO statistical year book 2020)



**Figure 10:** Share of women in agriculture, forestry and fishing employment (percent) (FAO statistical year book 2020)



**Figure 11:** Gross fixed capital formation (agriculture, forestry and fishing) as a share of value added (percent) (FAO statistical year book 2020)

## Statistics of Agriculture Sector Needs and Consumptions

As shown in figs (12- 24) the pesticide use recorded (1044 – 2803 tons) during the period 2000 - 2018. On the other hand, the pesticide use per cropland area recorded (0.51 – 1.34 kg per ha) during the period 2000 - 2018. chemical fertilizer use per cropland area by nutrient (kg/ha) ranged

(7.2 – 14.7) for nitrogen, (0.9 – 8.4) for phosphor and (0.2 – 2.5) for potassium. Furthermore, during the period 2000 - 2018, the total consumption of chemical fertilizers ranged (8.3 -25.6) (kg per ha) during the period 2000 – 2018. The nitrogen use per cropland area (kg / ha) of manure organic ranged (1.3 – 3.0) and (6.8 – 15.6) for mineral synthetic materials during the period 2000 - 2018.

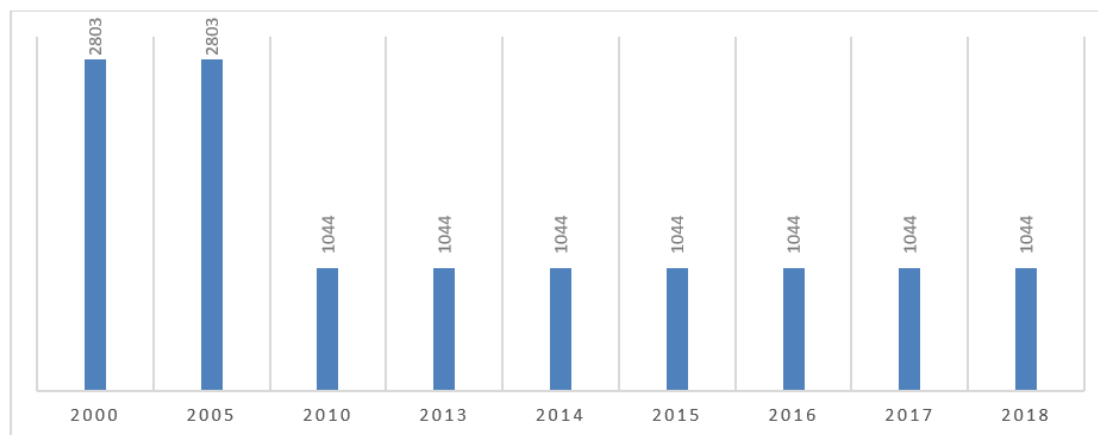


Figure 12: Pesticide use (tons) (FAO statistical year book 2020)

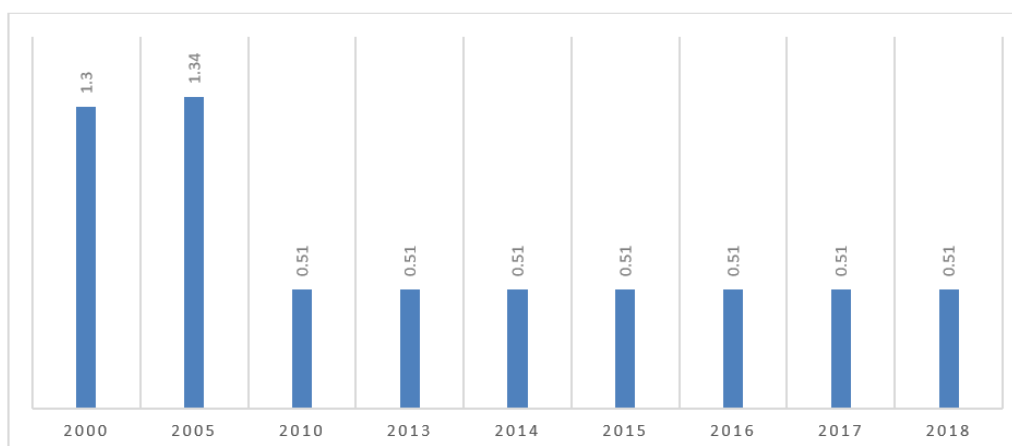


Figure 13: Pesticide use per cropland area (kg per ha) (FAO statistical year book 2020)

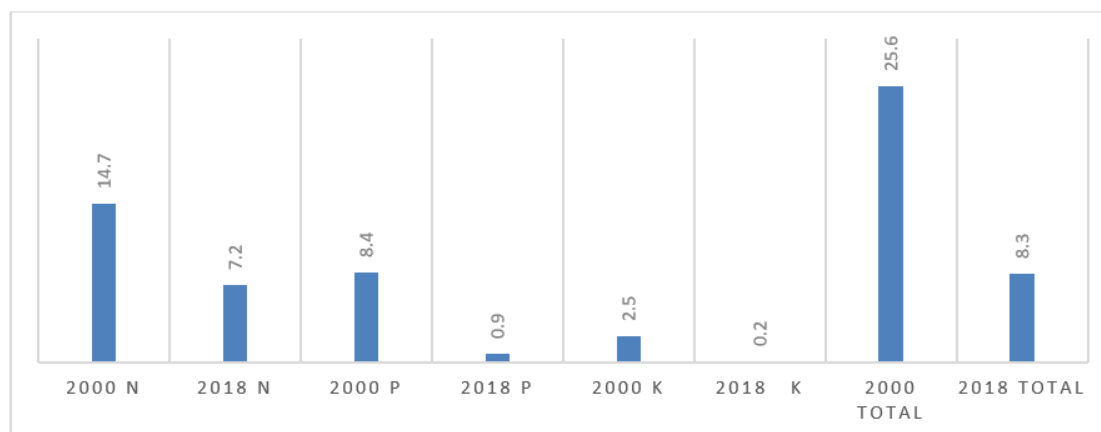
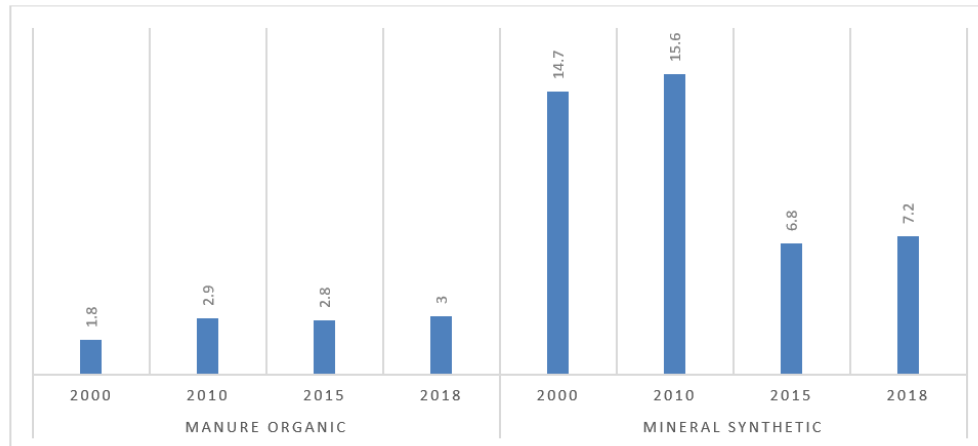


Figure 14: Chemical fertilizer use per cropland area by nutrient (kg per ha) (FAO statistical year book 2020)

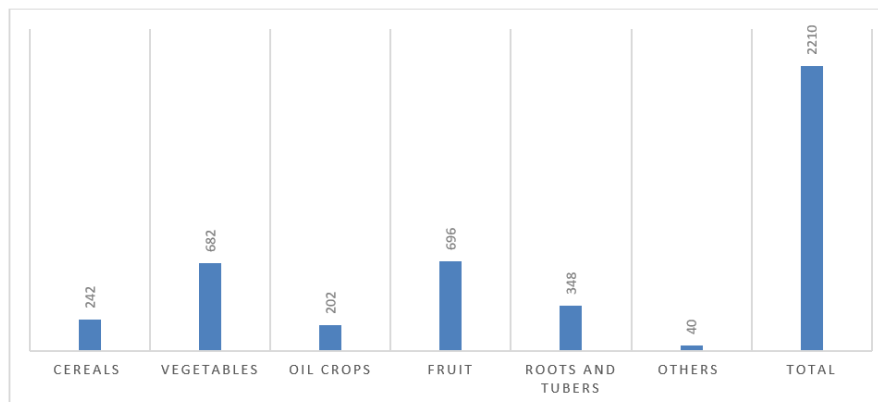


**Figure 15:** Nitrogen use per cropland area (kg per ha) (FAO statistical year book 2020)

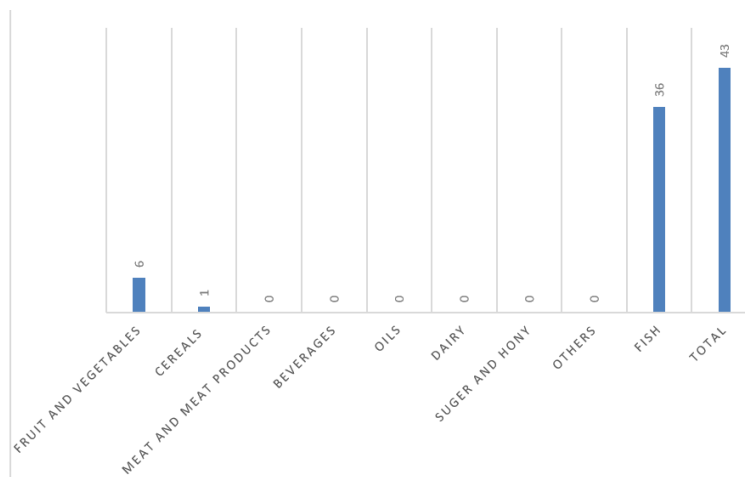
### Agriculture Sector Production and Food Security

As shown in figs (16, 18 and 19) fruits recorded the highest amount of the total agriculture production (696,000 tons) followed by vegetables (682,000 tons). While the total agriculture production recorded (2,210,000 tons) in 2018. On the other hand, the total food exports in 2018 recorded (43 USD millions), fish recorded the highest value (36 USD millions) followed by fruits and vegetables (6 USD millions). furthermore, the total food imports recorded (3167 USD millions), cereals recorded the

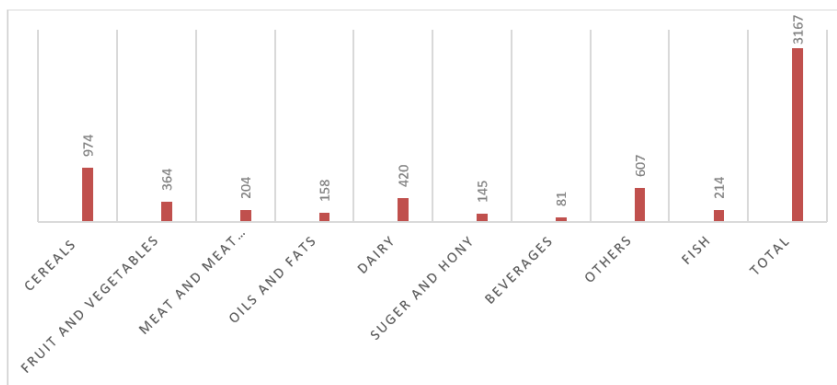
highest value (975 USD millions) followed by dairy (420 USD millions) while, beverage was the lowest (81USD millions). Wheat recorded the highest amount among cereal crop imports (1461.8 thousand tons) followed by maize (784.3 thousand tons) and rice (101.2 thousand tons). Moreover, cereals exports ranged between (0.0 in 2010) and (3.4 thousand tons in 2017). The percentage of obesity prevalence in the adult population recorded its lowest 23.5 % in 2000 and 32.5 % in 2018.



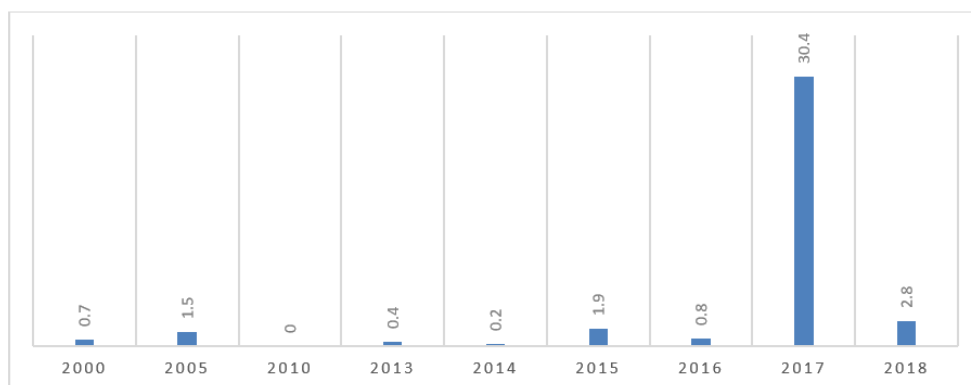
**Figure 16:** Production of primary crops by group, 2018 (thousand tons) (FAO statistical year book 2020)



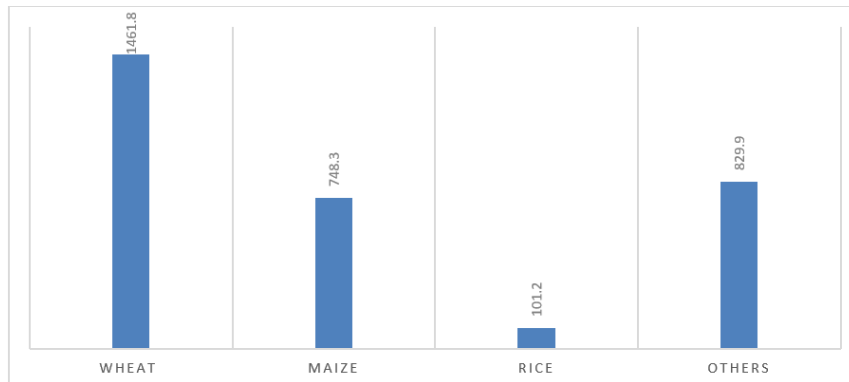
**Figure 17:** Food exports, 2018 (USD million) (FAO statistical year book 2020) (FAO statistical year book 2020)



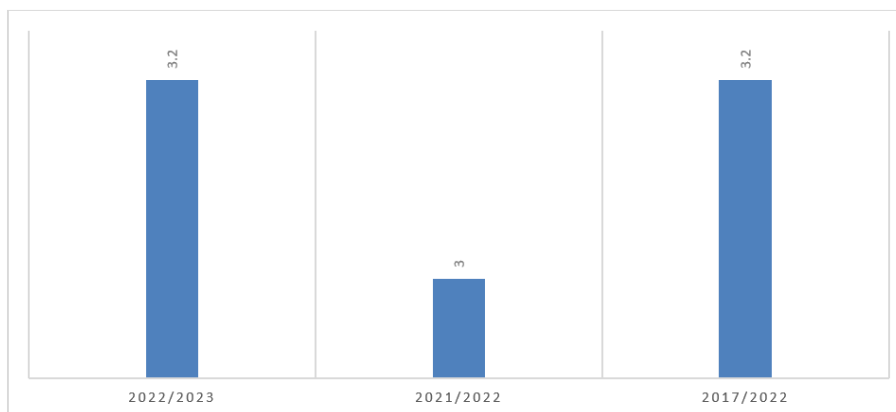
**Figure 18:** Food imports, 2018 (USD million)



**Figure 19:** Cereals exports (thousand tonnes) (FAO statistical year book 2020)



**Figure 20:** Cereals imports and exports by main commodities, 2018 (thousand tonnes) (FAO statistical year book 2020)



**Figure 21:** Average cereals imports 2017/2023 (million tons) (FAO report 16 august 2022)

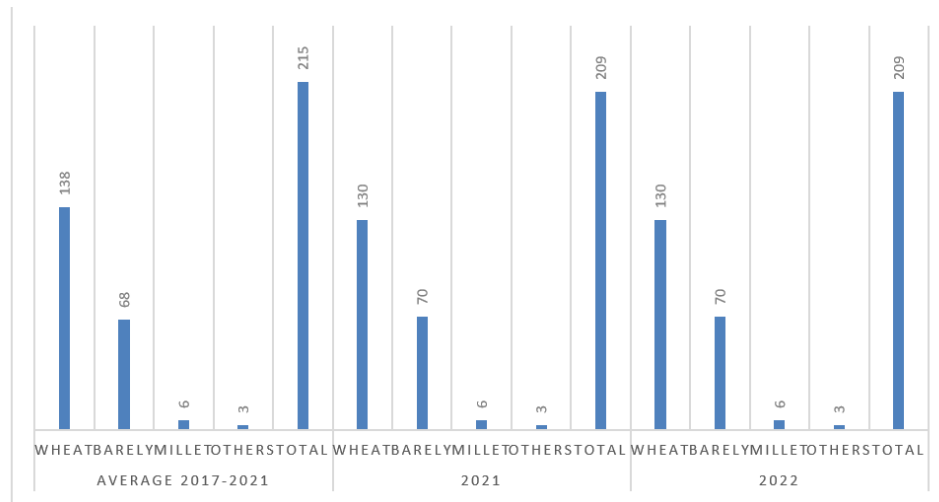


Figure 22: Cereals production (thousand tonnes) (FAO report 16 august 2022)

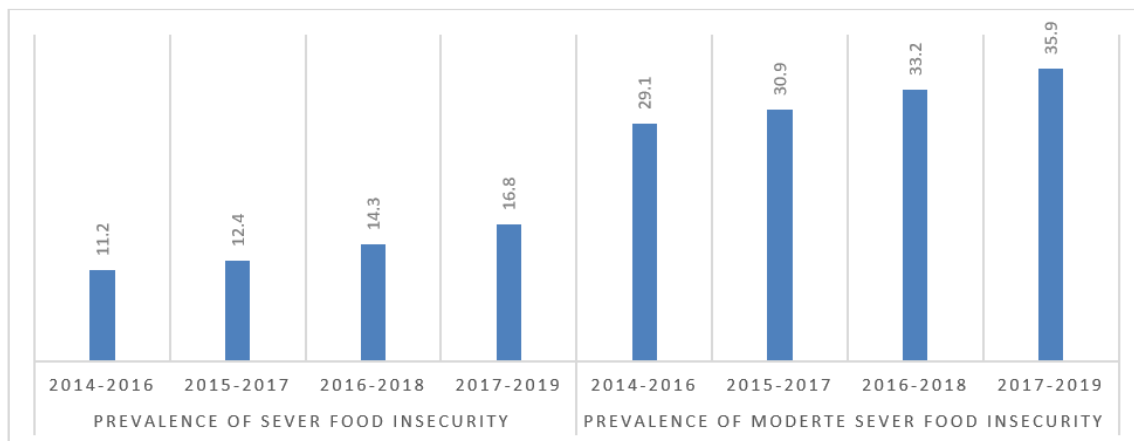


Figure 23: Food insecurity levels (percent) (FAO statistical year book 2020)

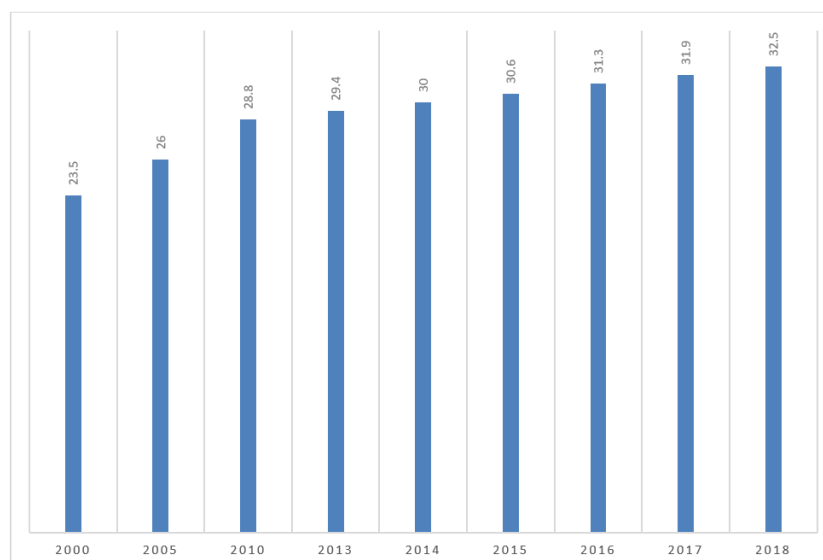


Figure 24: Prevalence of obesity in the adult population (percent) (FAO statistical year book 2020)

## 6- Water Consumption and Water Stress

Data presented in figures (25 and 26) shows that, water stress percentage ranged (615.4 – 817.1%) during the

period 2000 – 2018. The main source of water is ground water, while the greatest water consumption belonged to the agriculture activities followed by the domestic use.

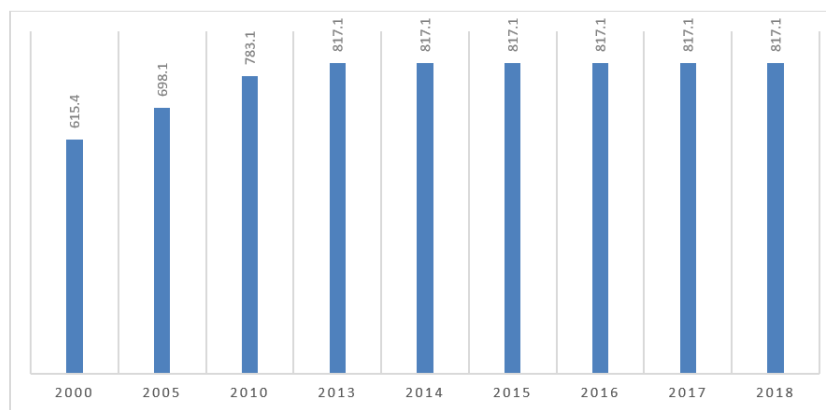


Figure 25: Water stress (percent) (FAO statistical year book 2020)

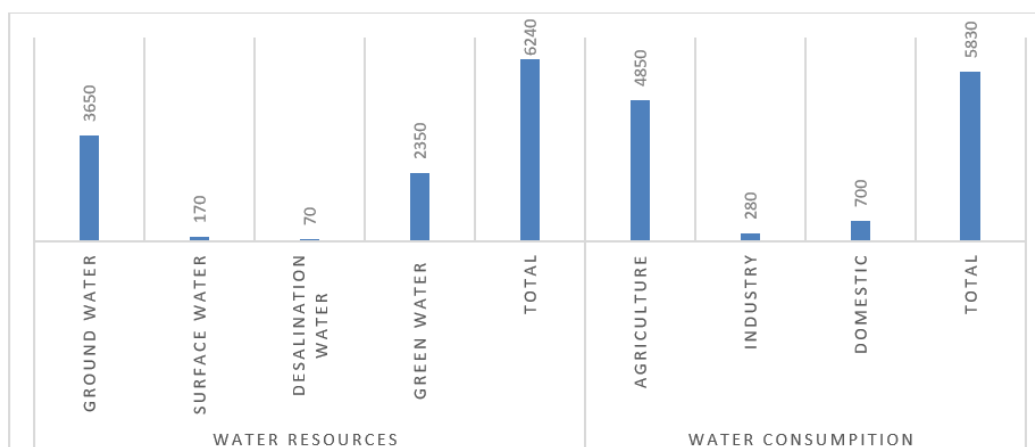


Figure 26: Water budget in Libya (million m<sup>3</sup>) CEDARE (2014)

## DISCUSSION

### Share of Agriculture Sector of the Total Libyan GDP

The Libyan agriculture sector shares an average of (0.7 – 1.1%) of the total Libyan GDP during the period of 2000 – 2018. With regard to these low revenues we could notice the great problem of the agriculture sector is the lack of management policies, because an ancient agriculture activities were established in Libya hundreds of centuries ago and a high crop products value stile established such as olive, almond, and other fruits and ornamentals. Ying Feng *et al.*, 2013 reported that, In Libya there are 2103 species that belong to 856 genera and 155 families. The distribution among Libyan seed plants was characterized by a high proportion of herbs (annual to perennial), unlike the low number of woody (tree and shrub) species; these have an important influence on the structure of the floral composition. With regard to the rich Libyan flora and its various weed canopy, a great effort by the Libyan authorities, the social and non-governmental organizations should take place to enhance the Libyan agriculture economy and its related sectors. In 2010, agriculture accounted for only 3 percent of Libya's GDP. Throughout the preceding decades, its role in Libya's economy had declined in relation to the country's dominant oil industry and growing services and construction sectors. Stagnation in the sector made the

country highly dependent on imports. Before 2011, Libya imported 80 percent of its consumption requirements, with wheat, oil, maize, and milk comprising the main commodities sourced from abroad (FAO ,2011).

### Agricultural Land and Irrigation Equipment

The crop land area ranged between (2,050,000 – 2,150,000 ha) during the period 2000 - 2018 while, the percentage of area equipped for irrigation in land area ranged (2.6 – 3.0%). While the area of forest land recorded (217,000 ha) during the same period. The former data shows a very small irrigated area in comparison with total agriculture land area, while the crop land area is only 12.0 - 13.0% of the total agriculture land area (15,450,000 ha). Despite a very limited crop land and irrigated area is occupied but a very good revenue may be expected if a successful management procedures are established, especially for the high price products such as olive, olive oil, dates, date products, nuts, and ornamentals. The marketing polices are also very important, the Libyan agriculture products are poorly marketable in the neighbor's countries. On the other hand, an effective food industry depends on the local agriculture and dairy products should be established. agriculture still represents an important source of income in rural areas, with notable regional variations. In the east and south, the population heavily depends on

salaries and pensions provided by the government or private sector, while agricultural activities are generally considered secondary income sources. In the west, meanwhile, there is a higher dependency on agriculture as an income source as these areas have some larger scale farms. Eastern, southern and western districts alike hold a strong potential to enhance their agricultural production. However, since 2011, multiple episodes of conflict and political instability have exacerbated already existing challenges, such as water scarcity, animal and plant diseases, desertification, and the low availability of workers. The conflict has also had important implications for the agricultural labor market. More specifically, the number of migrant laborers has fallen in recent years due to concerns about the country's fighting and insecurity. A lack of labor, combined with the low value of the Libyan dinar, has pushed up wages compared to previous years, challenging local farmers with only limited financial resources (FAO, 2017).

### Employment and Workforce in Agriculture Sector

the total workforce in agriculture sector in Libya ranged between (332000- 377000) workers with a percentage of total Libyan employments (18.4 – 24%). The women share in agriculture employment recorded (35.9 – 40.8 %) of the total agriculture workforce during the period of (2000 – 2018).

Faragand Ab-Rahim, 2022 reported that, the agricultural sector plays an important role in Libya's economic development, but this role has failed to achieve a high rate of participation in the gross domestic product. Participation remains minimal as her contribution has decreased from about 8.17 percent in 2000 to 3.69 percent in 2019. This is because the agricultural policies of successive governments have failed to manage the factors of production, including aspects of agricultural labor, and have failed to produce the desired results. Therefore, this study examines the impact of agricultural labor force on agricultural GDP. A related report by U N 2019 concluded that, the public sector remains the most important employer in Libya (84 per cent of the total workforce and 97 per cent of female employees in 2012). The majority of Libyan workers are on permanent contracts (94% and 81% respectively). public or private sector share). The bloated public sector is having a negative impact on youth and women's employment. The overall unemployment rate rose from 13.5% in 2010 before the uprising to 19% in 2012 before the uprising, and the overall unemployment rate rose from 13.5% in 2010 before the uprising to 19% in 2012. Libya has a young population (aged 15-34) that makes up one-third of the population. This represents a huge opportunity, reflected in young people's willingness to participate in social development, economic productivity and even peacebuilding, despite a surge of more than 1,700 armed groups. Libyan youth live the paradox of high levels of education on one hand and low access to opportunities of civic or economic participation

### Statistics of Agriculture Sector Needs and Consumptions

the pesticide use recorded (1044 – 2803 tons) during the period 2000 - 2018. On the other hand, the pesticide use per cropland area recorded (0.51 – 1.34 kg per ha) during the period 2000 - 2018. the total consumption of chemical fertilizers ranged (8.3 -25.6) (kg per ha) during the period 2000 – 2018. The previous results cleared the very low fertilizer consumption rate in the Libyan crop land compared with the global rate (146.4 kg/ha) (FAO, 2020) which reflexes the low productivity and quality of the Libyan agriculture products. Moreover, the lack of fertilizer industry in Libya leads to a great reliance on the imported fertilizers a long with the logistic problems such as shipping, transporting and distributing specially during the security problems. On the other hand, the lack of a government strategy for the agriculture sector and food security enlarges the problem. Furthermore, an integrated pest management programs is required to keep the crop loss under the economic threshold. The Libyan pesticide use per cropland area recorded (0.51 – 1.34 kg per ha) while the world global rate of pesticide consumption is (1.8 kg/ha) (FAO, 2022). A great global demand on the agriculture organic products could be a suitable reason of creating an advanced agriculture policies depending on the sustainable use of the natural resources specially in the agricultural activities. The low pesticide use rate may be an advantage but the economic crop loss caused by the agriculture pests needs some effective pest control measurements. So integrated pest management (IPM) and biological control programs are required and should be enhanced by the government organizations such as research centers and universities.

### Agriculture Sector Production and Food Security

fruits recorded the highest amount of the total agriculture production (696,000 tons) followed by vegetables (682,000 tons). While the total agriculture production recorded (2,210,000 tons) in 2018. On the other hand, the total food imports recorded (3167 USD millions), cereals recorded the highest value (975 USD millions), Wheat recorded (1461.8 thousand tons) followed by maize (784.3 thousand tons) and rice (101.2 thousand tons). The former data cleared the dependence of the Libyan food consumption on the imported products specially cereals. FAO 2022 reported that, Libya relies heavily on imports (up to 90 percent) to cover its cereal consumption requirements (mostly wheat for human consumption and barley for feed) and changes in domestic cereal production have a limited impact on the magnitude of the import requirement. In the 2022/23 marketing year (July/June), the import requirement is projected at 3.2 million tones, about the same as in the previous year and close to average. Between 2016 and 2020, the country sourced over 30 percent of its wheat imports from Ukraine, and 20 percent from the Russian Federation. Almost 65 percent of total maize imports of 650 000 tones, and 50 percent of total barley imports

of 1 million tones originated from Ukraine, making the country vulnerable to disruptions in shipments from the Black Sea region. A former farm work conducted by FAO 2011 showed that, the low agricultural productivity of most of the crops grown and the growing demand for food have made Libya a net importer of food. High priority is therefore given to the development of improved seeds and propagation materials to increase the productivity of food crops, especially cereals, olives and dates, and to the development of improved production systems. Due to limited technical capacity and relaxed quarantine measures, new species of plant and animal pests and diseases are reportedly entering the country and encroaching on agriculture. This further complicates an already fragile animal and plant welfare system and is a cause for great concern. With regard to the military conflicts that occurring in Libya from 2011 till now, the government and the global efforts to enhance the Libyan food production sector are facing a great security and financial problems and challenges. Another vital problem facing the agricultural activities in Libya is the lack of the human work force and the agribusiness specialized companies in addition to the water resource problems. Libya was in 2004 nearly self-sufficient in potatoes (94%), vegetables (94%) and fruit production (93%), with productions valued at 76 million USD, 463 million USD and 237 million USD. Local entrepreneurs such as Zagrit Co argue that Libya has a good potential for further expanding the sector, options for export to the EU and neighboring countries have been explored in the recent past (market studies by Zagrit Co). An example of European investment in Libyan agriculture is the consortium from Rieti, Italy, which in 2006 invested EUR 500 000 to produce and process vegetables to export to Europe. When production reaches full capacity in 2012 the project will create up to 3 000 jobs and will have an estimated annual turnover of EUR 500 million. Zagrit Co collaborates with the Dutch horticultural sector on imports of greenhouses (plastic and glass), with different seed companies in the Seminis Group (CFDI, 2012). The former argument clears that, the Libyan agriculture system can create a self-sufficient of various agriculture commodities if a significant enhancement procedures are established.

## 6- Water Consumption and Water Stress

water stress percentage ranged (615.4 – 817.1%) during the period 2000 – 2018. The main source of water is ground water, while the greatest water consumption belonged to the agriculture activities. It could be cleared from the former data that, a great stress on the Libyan water sources is occurring and an advanced water management procedures are absent. AICS, 2022 reported that, an assessment of the water use for the agricultural sector should be undertaken to support monitoring, evaluation, and rationalization of water use, to enhance agricultural water management performance, particularly water consumption and productivity. As a

result, a strategic plan for water resources management that reviews the water, food and energy needs should be formulated (AICS, 2022). Moreover, water resources in Libya originate from seawater desalination, wastewater, surface water, and groundwater. The existing desalination plant produced 70 million m<sup>3</sup> in 2012, exclusively for municipal and industrial purposes (Aguasat, 2016). Groundwater, both shallow and fossil aquifers, represent the main source of water supply in the country (Salem, 2007). Both shallow (Jabal Nafusah, Jifarah, Jabal al Akhdar, and Murzuq) and fossil groundwater (Kufrah) are recharged by rainfall at a rate of approximately 650 million m<sup>3</sup> per year (Salem 2007).

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