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Syrian crisis repercussions on the agricultural sector: case study of wheat, cotton and olives

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Abstract:

This paper aims to outline the consequences of the Syrian conflict on the land use /cultivated area, yield and production of the main crops: wheat, cotton, and olives. To achieve the study goal secondary data were collected from FAO website. After that the autoregressive integrated moving average (ARIMA) model was applied for the time series analysis. Finally, the decrease in production was calculated and the total losses were valued at the local and international prices. A long-term analysis from 1960- 2016 showed a significant positive change for the main studied crops, but a significant negative change was noticed from 2000 to 2016 due to the conflict issue in Syria. while, the highest reduction was recorded in 2014 for wheat and olives by 47.53% and 64.18% respectively and in 2016 for cotton with more than 93% of the total reduction. Whereas, the total losses in local prices were (1,168,204,415 USD) and (4,733,586,663 USD), valued at the international price for the main crops: wheat, cotton, and olives, which are 9% of the 2011 Syrian GDP.

Keywords:

Syrian conflict; Land use; wheat; cotton; olive; ARIMA.

1. Introduction:

The Syrian conflict is one of the most complicated conflicts in the recent history. Different factors such as the ethnical and religious diversity, and the complexity of the political and social structure led to a significant difficulty in analyzing this conflict as well as multilateral foreign and regional factors that strongly influenced the crisis (Bhardwaj 2012; Sizemore 2014; Hove and Mutanda 2015; Haran 2016; Hokayem 2014; Gleick 2014; Carpenter 2013; Phillips and Valbjørn 2018; Ianchovichina 2018). However, because of that on-going conflict, approximately 6.45 million people were displaced within Syria, and more than 2 million crossed the boarders as refugees (Yazgan et al. 2015; Al-Natour et al. 2018; Heydemann 2013; Adamson and Tsourapas 2019; Okyay 2017; UNHCR 2018; Aburas et al. 2018; Gauci et al. 2015; Crawley and Skleparis 2018; Tudor 2015; Van Heelsum 2017; Errighi and Griesse 2016; World Bank. 2017). These demographic changes as well as the conflict situation adversely affected the agricultural sector leading to a change in the land use patterns and reducing both of the cultivated land and the agricultural production (Eklund et al. 2017; HON 2018; Akinyemi 2017; Baumann and Kuemmerle 2016; Butsic et al. 2015; de Beurs and Henebry 2008; Baumann et al 2015).

The agricultural sector is an important economic sector in Syria; where 30% (6.5 million ha) of the Syrian lands are arable (24.65% irrigated and 57.89% rainfed). Approximately, 8.9 million people (44.5% of Syrian population) live in rural areas, and more than one million (19.4% of the Syrian labour force) work in agriculture. The exceptional importance of the Syrian agricultural sector lies in that it constitutes an economic resource for more than 46% of the Syrian population in addition to the significant contribution to the Syrian national economy where more than 31% of the total Syrian exports come from the agricultural sector (Central Bureau of Statistics 2011; Al Bakeer 2018).

Before the conflict; the agricultural sector had been one of the main pillars of the Syrian economy with good contribution to the Gross Domestic Product GDP and to more than 20% of the Syrian labour force. Even with the decline in the contribution from 21% of GDP in 1980 to 14.1% in 2011, the agricultural sector remained one of the main sectors of the Syrian economy (Central Bureau of Statistics 2011; De Châtel 2014; Rocchi et al. 2013; Issa 2014; Mrabet and Alsamara 2018; World Bank. 2008, Alkhalil 2009). Meanwhile, the government policies play an important role in contributing to the agricultural sector in the GDP, by integrating inputs, outputs and price policies for production, to achieve the best possible profit. Moreover, the economic data analysis shows that agriculture sector comes second after the industrial sector in income-resources (Central Bureau of Statistics 2011; Issa 2014). Interestingly, Syria used to be the only Arab country that self-reliant in providing its needs of wheat which ranks as the first among the grain crops known as strategic crops, with more than 1.7 million hectares of wheat, 172414 hectare of cotton and 79000 hectares of olive trees, fig. 1. Showed the distribution of the main crops by governorate in Syria (Ministry of agriculture 2014; Alkerdi 2014, NAPC 2011; Abdul-Aziz 2007).

However, in the last 7 years, the armed conflict badly affected the human, social, and physical capital, along with significant losses in different economic sectors. In fact, it was estimated that the total economic cost of the armed conflict in Syria was equivalent to 229% of the country's GDP in 2010 (DCRS 2016; Mehchy et al. 2015; Estrada et al. 2018). In the same context, the total estimated losses reached 254.7 billion $, which was equivalent to 468% of Syrian GDP by the end of 2015 (Syrian Center for Policy Research 2016).

Actually, scholars argued about the roots of the Syrian conflict. The ideas can be easily categorised into two groups. The first group think the Syrian crisis is a direct impact of climate change, especially the drought that hit Syria between 2006 and 2009 and caused a crop failure (especially for wheat and grazing). It also resulted in a massive migration from the eastern parts of Syria, such as AL-Hasaka, Deir al-Zeer and Raqqa to major cities, such as Damascus, Aleppo, and Daraa, where the uprising started leading to a big pressure on both sides (IDPs (internally displaced persons) and host communities). These were accompanied internally by the government's price liberalisation policies and by a new trend towards the social market economy (Kelley et al. 2015).

While The second group believes that the economic and social governmental policies before the crisis are the main causes of the current crisis. The Syrian economy achieved positive records at the macro level, such as good growth rate (4.45%; 2000-2010), low unemployment rate (8%; 2003- 2010), low Gini Coefficient (0.347 in 2009), budget deficit less than 5% of GDP, surplus trade balance, and low public debt (23% of 2010-GDP),accompanied with a good track records in health, education, infrastructure and the millennium development goals (measured by per capita income) where the government was the main funder for education, health, and infrastructure services (DCRS, 2013)

However, despite all of these positive indicators, the Syrian national economy was suffering from some structural imbalances, such as the dependence of growth sources on quantitative indicators, particularly the material capital, inflation of real estate and financial speculation sectors, and low wages with high taxes rate, in addition to high rates of tax evasion, poor efficiency of government spending, especially in the investment sector, accompanied with mismanagement of national resources. As a result, poverty was accelerated rapidly as a consequence of the failure in providing alternative employment opportunities. Similarly, the institutional sector was suffering from institutional dysfunction which was characterised by poor participation, political accountability and lack of transparency. All in all, the political institutions in Syria failed to meet the demands of the society, which led to the social explosion in March 2011(DCRS, 2013).

The Syrian agricultural sector was one of the key sectors that suffered significant losses, leading to a collapse in most of the agricultural systems that were built during the last 40 years (Tull 2017; Middleton et al. 2018; Jaafar and Woertz 2016; Jaafar and Ahmad 2015). Syrian Center for Policy Research (2016) demonstrate that 2014 was one of the worst years for the Syrian agricultural sector, due to drought and conflict, which negatively affected the agricultural production because of the destruction of irrigation systems, crops looting or/and burning, in addition to the unavailability of production facilities such as fertilizers, seeds and fuel, beside a shortage of agricultural labour force. As a result, the gross domestic product (GDP) shrank by 19.4% in 2014 in comparison with 2013. Interestingly, FAO (2017) estimated the total losses of the Syrian agricultural sector between 2011 and 2016 at 16 billion dollars, distributed to 7.2 billion$ in crop production and 5.5 billion$ in the livestock sector. For instance, Jaafar et al. (2015) studied the impact of the Syrian conflict on the irrigated agricultural production in the Orontes Basin. The study concluded that agricultural production dropped between 15% and 30% in 2000–2013. Similarly, Jaubert et al. (2014) concluded that the conflict situation in the Qusair region of Homs led to lose more than 70% of the agricultural production.

However, this paper aims at contributing to a better understanding of the repercussions of the Syrian crisis on the agricultural sector, and showing how the crisis affected land use trends. It also provides a simple calculation of the total losses expected for the main Syrian agricultural crops (wheat, cotton and olives).

2. Materials and Methods

2.1. Data collection

The secondary data collected from FAO website (http://www.fao.org/faostat/en/#data/QC) and Syrian Ministry of Agriculture and Agrarian Reform websites (http://moaar.gov.sy/main/archives/17612), where 2011 was concedered as a base year of the study.

A time series is defined as a sequence of data observed over time. ARIMA models are a class of models that have capabilities to represent stationary as well as non-stationary time series and to produce accurate forecasts based on a description of historical data of single variable. (Kumar and Anand, 2014). The autoregressive integrated moving average (ARIMA) model was used for the time series analysis. In addition, the logarithm of all real-time series values for all studied crops variables (production, area, yield), was applied to eliminate the variances between series values, in order to achieve the higher stationarity in the series.

2.2. Test for stationarity:

The studied series of all crops had a trend as it showed in Fig.3,4,and 5, which means that they are not stationary. Then, the first difference of current and immediate previous one ($X_t = X_t - X_{t-1}$) was taken to make them stationary. Our null hypothesis (H_0) in the test is that the time series data is non-stationary while alternative hypothesis (H_a) is that the series is stationary. The hypothesis then is tested by performing appropriate differencing of the data in dth order and applying the Augmented Dickey-Fuller (ADF) test to the differenced time series data. The (ADF) test results for all series, as obtained upon application, are shown in table 1.

We, therefore, fail to accept the H_0 and hence can conclude that the alternative hypothesis is true i.e. the series is stationary in its mean and variance.

2.3. Autocorrelation and partial autocorrelation functions

The autocorrelation (PAF) and the partial autocorrelation (PACF) plots of all studied series, after getting the first difference, are shown in the Figure 2.

Selecting ARIMA models:

ARIMA models for all series have been chosen according to the highest significant levels and the lowest mean square error index (MS value) among the suggested models, as it is shown in the Table (2):

2.5 Lost production value

The lost production value has been calculated by multiplying the lost amount of production (ton) by local and international price separately, while, production costs have been collected from the Syrian Ministry of Agriculture and Agrarian Reform website.

Losses have been calculated by taking the difference between the lost production value and the production costs based on both international and local prices, international prices have been taken from different resources(www.statista.com; www.indexmundi.com; www.macrotrends.net). However, as local prices are provided in the local currency SP, then the study applied the exchange rate according to the dollar value in the black market (table 3) not as given by the Syrian Central Bank because of the big difference between them and to make the results more realistic.

Results and discussion

The successive agricultural policies in Syria have strengthened the role of the agricultural sector, particularly the strategic crops (cotton, wheat, sugar beets, barley, and olives), by providing all the necessary support through loans, fertilizers and agricultural facilities accompanied with advanced agricultural research. Interestingly, the agricultural sector has witnessed a remarkable progress in terms of productivity and cultivated areas where agriculture plays an integral role with the rest of the industrial sectors and constitutes the raw materials for the national downstream industries.

Despite the importance of the agricultural sector in Syria, agriculture can be described as primitive and traditional agriculture. The arable land accounts for 32.1% of the total Syrian lands, while the rest of the lands are distributed as non-arable lands, pasture, meadows and forests. The agricultural land is distributed as cultivated land (4742500 ha) and fallow land (84500 ha). Most of the agricultural activities were conducted in rai-nfed lands (3340400 ha), while the rest of arable land were assumed to be as irrigated land (1400000 ha). Thus, more than 70% of the Syrian agricultural land was affected by rainfall changes from year to year, while, the irrigated land produced 100% of summer production and about 45-70% of total winter production (Alkhalil 2009; Al-Youssef 2016; NAPC 2005).

Wheat is one of the most important strategic crops in Syria and the backbone for food security, while cotton plays a great role in supporting the balance of payments, and comes second after oil in the Syrian exports list but comes first in the list of Syrian agricultural exports. Similarly, olive cultivation comes in the third place after cereals and cotton. Syria is ranked as the six country in olive production all over the world; interestingly, olive contributes 1.5-3.5% of GDP. (Naser and Majd El-Din 2006; Al-Mohammad and Naser 2015; Abedallh 2014; Anka et al. 2017, Dayoub et al., 2017).

Generally, there is a positive trend (1960- 2016) in all of the indicators (Land use /cultivated area, Yield, Production) for the crops under review (wheat, cotton, and olives). Production had changed rapidly between 1960 and 2011, in addition to yield and cultivated area as can be seen in fig.3, fig.4 and fig.5. Such positive trends can be easily explained by the rapid increased of advance agricultural research and plant breeding for adapting new varieties handled by the General Commission for Scientific Agricultural Research (Damascus), as well as the agricultural input subsidies by the government (subsidies for diesel and price support for strategic crops) (Aw-Hassan et al. 2014). Thus, the wheat production changed from 757000 ton/ha in 1960 to 2936783 ton/ha in 2016 with 388% as general increase. Similarly, yield and cultivated area increased 388% and 99.9% respectively over the whole period. Interestingly, the area cultivated by olives witnessed a significant increase of 957%, accompanied with 113% as a yield increase. Such changes can be explained by the ecological flexibility of olives, as well as the possibility of cultivation in marginal areas (Anka et al. 2017; Jamal 2007). In a similar vein, cotton yield increased significantly by 113%, while the cultivated area of cotton did not achieve high ratio (although this increase is significant) and remained up to 18%. On the contrary, the yield recorded an increase that reached 197% due to developing and adapting seven varieties of cotton which led to increasing the yield (Al-Mohammad and Naser 2015).

The agricultural plans for the country are usually conducted by the government (Ministry of Agriculture), and is distributed then to the Directorates of Agriculture in the governorate as a work plan for each one. By the beginning of the Syrian crisis in March 2011 in the governorate of Daraa and some areas in Damascus and Homs (Selby et al. 2017, De Châtel 2014, Gleick 2014), most of the agricultural plans had been completed; therefore, the year 2011 was considered the standard year for calculating the accumulated losses in the agricultural sector. For more investigation about the effect of the Syrian conflict on the agriculture sector, a time series from 2000 to 2016 had been chosen for analyzing yield and production changes for the studied crops as can be seen in fig. 6 fig. 7 and fig. 8. Within this context, tracking the changes of yield and production showed that the years from 2006 to 2010 were the disastrous for the agricultural sector in Syria due to successive drought cycle that hit the eastern region leading to a significant reduction in yield and production (Malm 2016; Selby 2018; Selby et al. 2017; De Châtel 2014; Gleick 2014; Trigo et al. 2010; Shean 2008; Hole 2009; Solh 2010; ACSAD 2011). In contrast, 2011 was listed as a good year. After that, a massive collapse in the agricultural sector was recorded, because of the acceleration of the Syrian conflict. This point can be specifically addressed from several perspectives. The government can no longer provide the necessary support for farmers, such as loans, seeds, pesticides, irrigation projects and electricity. In addition to scarcity of fuel (due to the American sanction), destruction of the infrastructure by ISIS, and exchange rates fluctuating of the dollar associated with poor security conditions in the conflict zone. All of these factors led to reduction in the agricultural labour force where some of the farmers were forced to flee or to resort to the neighbouring countries, which had a catastrophic impact on the agricultural sector (DCRS 2016; World Bank, 2017; Abboud, 2016; Jaafar and Woertz 2016; FAO and WFP 2015; Eklund et al. 2017). Generally, the studied crops dropped except for the olive crop, which can be tracked with a positive trend. Such a phenomenon can be explained as the main olive growing areas (Tartous, Lattakia, Homs, and Hama) continued their agricultural plans because they were, to a certain extent, alienated from the Syrian conflict despite being affected by some obstacles, such as the shortage of agricultural labour forces, and the high prices of raw materials and production tools. On the other hand, the cultivation of major crops (cereals, wheat, and olives) has influenced the customs and traditions of the Syrian population, with each crop having its own rituals at harvest, which differ from one subregion to another. To harvest cotton - which is known as "white gold" - workers (women) from different families in the eastern part of Syria used to wake up in the early morning to go harvesting. During the working hours, women used to sing traditional songs related to cotton and other crops. Somehow, these songs were passed down to girls and to later generations until they became customs and traditions associated with the collection of white gold. The popular songs and the hymns include rules, proverbs and realistic stories, which people learn and benefit from, and they remain as part of this region's heritage. (eSyria, 2018).

In a similar vein, olive harvesting is considered an important economic event for farmers. It is a season of joy and the revival of popular and traditional rituals (SANA 2017). The importance of the olive can be seen in its popularity as a widespread food in Syrian culture, and it is known as green gold. Generally, the olive is harvested from October in most of Syria's governorates. Most Syrian farmers disperse over the fields, moving over the land from early morning till sunset. Interestingly, most city dwellers return to their villages for one week or more to participate in this event. Moreover, some large-scale owners may hire workers from neighboring villages or from the same village to help them, which creates social relationships among different families. At night, in some villages, some families invite relatives to separate the olives from the leaves and sticks which affect the flavor of the oil. Guests often receive a certain quantity of olives as a gift from the owners of the field. Such activities and meetings usually occur as a result of the harvest.

Wheat harvesting is slightly different from cotton and olives, in that in the large flat irrigated cultivated area (in the eastern part of Syria), wheat harvesting is done by machine, and so many traditional habits have disappeared. However, in the western and southern parts, where wheat is cultivated in small areas, wheat harvesting still has its own customs as collective work that needs a collective effort in order to get it finished. Thus, farmers collaborate with each other and try to finish field by field. Generally, harvesting is accompanied by singing and chanting which motivates the workers to do their difficult work the day. The harvest involves a popular system which governs how and where to start the harvest, who leads the harvesters, how the harvesters are divided up, and their names and tools. Interestingly, many farmers used to hire workers to help them, not only from other villages, but also from other countries, especially in the Hauran Plain (southern of Syria), where harvesters used to come from neighboring countries (Lebanon, Palestine) (ultrapal; 2017). The harvesting season in many parts of Syria (before the current conflict) emphasized the crucial role of collaboration between peoples/farmers regarding their ethnicity or religion. Unfortunately, the current conflict has badly affected the social structure as well as the agricultural sector, in which most of the customs and traditions of the Syrian farmers have disappeared.

As mentioned before, the year 2011 was adopted as the base year for calculating the accumulated losses in the agricultural sector; therefore, the decrease in production was calculated through measuring the difference between the production during the studied years (2012- 2013-2014-2015-2016) and the base year (2011). The highest differences were tracked in 2014 for wheat and olives, reaching47.53% and 64.18%, respectively. Within this context, cotton production was badly affected in 2016 which was considered the worst year, with more than 93% of the total loss. These results can be accounted for by the escalation of the conflict in 2014, the failure of the implement the agricultural plans, massive migration towards safer areas, and the drought (in the Orontes basin), as well as the expansion of the conflict towards the main areas of cotton cultivation such as Hama, Raqqa, Aleppo and Idlib in 2016 where most of the area was ruled by ISIS (Jaafar and Woertz 2016; FAO and WFP 2015; Fick 2015). The calculated losses for wheat crops reached 56 and 302 million dollars at local and global prices respectively in 2014. While the accumulative losses of wheat during the conflict period (till 2016) exceeded 206 and 735 million dollars at local and global prices respectively, as shown in tables 4 and 5. Similarly, 353 Million dollars in international prices was calculated as losses for the olive crops in 2014 (table 6). Whereas, the total losses of olive crops were about 795 million dollars in the world till 2016 (to the best of our awareness, there are no data about the local price). Finally, concerning the cotton crops, the highest losses recorded in 2016, with 56 and 793 million dollars at local and international prices, respectively. While the total losses were about 167 million dollars at local prices, and about 3204 million at international prices between 2012 and 2016 (Tables 7& 8). In general, the accumulated total losses for wheat, olives, and cotton between 2012 and 2016 were about 4 billion and 734 million dollars at international prices, which constitutes about 9% of the 2011 Syrian GDP (Syrian GDP 2011 = 53.67 billion dollars: https://countryeconomy.com/gdp/syria?year=2011), and more than 40% of the contribution of agricultural sectors to GDP.

Conclusion

The agricultural sector is one of the most important sectors in Syria, which contribute to the national economy, provide employment and reduce the trade deficit. For many reasons, the contribution of the agricultural sector to GDP declined during the conflict. The results show the catastrophic effects of the Syrian conflict on the agricultural sector, Moreover, the accumulation the of the total losses for wheat, olives, and cotton between 2012- 2016 was about 9% of the 2011 Syrian GDP. Therefore, special attention shall be paid for the agricultural sector in the rehabilitation stage after the end of war in Syria. Also, decision makers (government and/or NGOs) should have incentive plans and projects to support farmers' return to their land and resume their agricultural activities.

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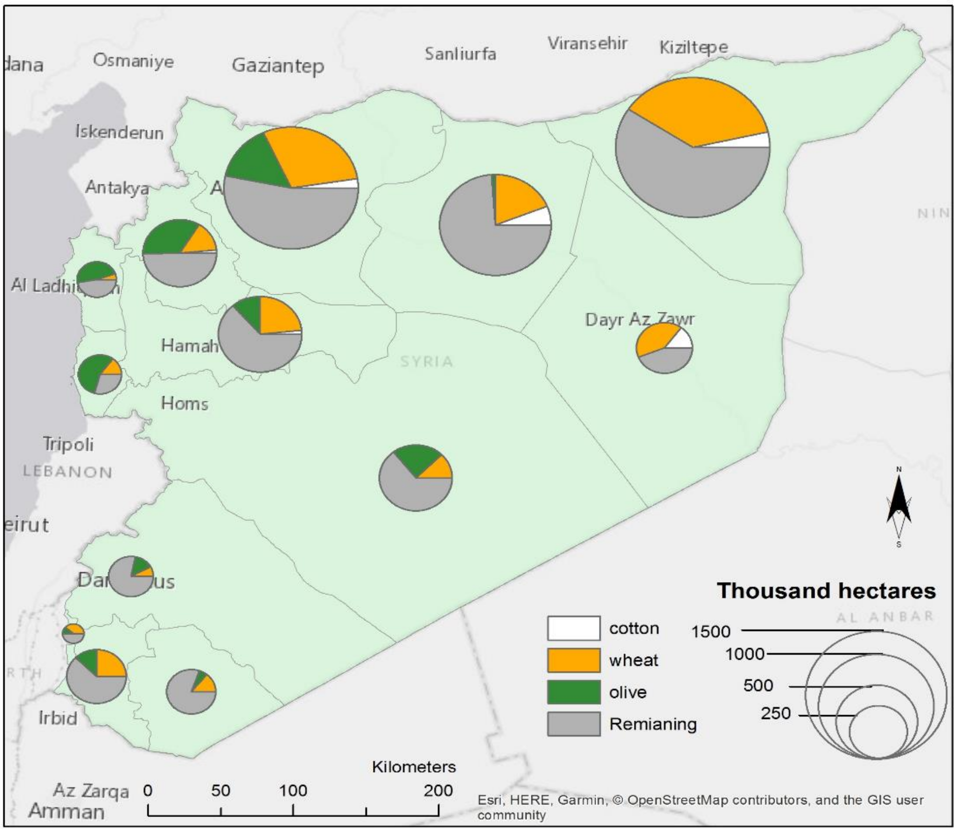
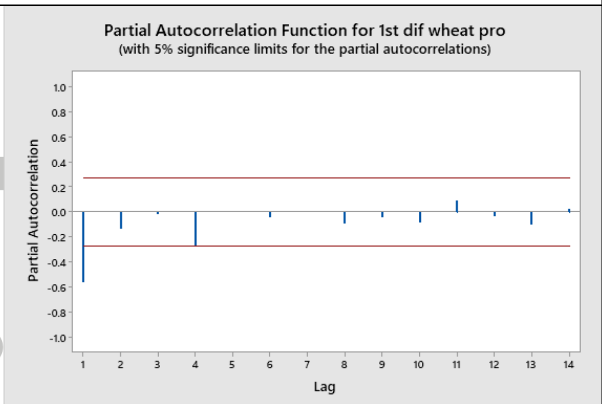
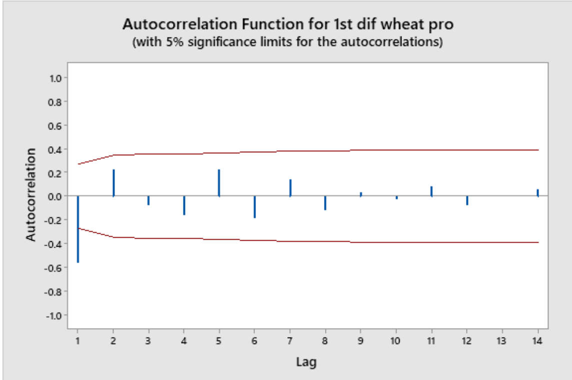


Fig (1) distribution of Wheat Olive Cotton by governorate in Syria
source:(Ministry of agriculture 2014)

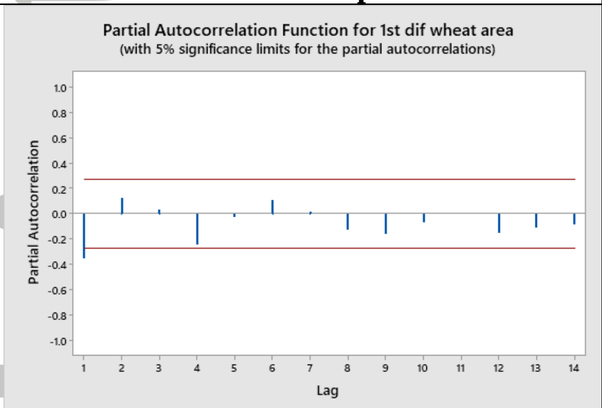
Partial autocorrelation	Autocorrelation



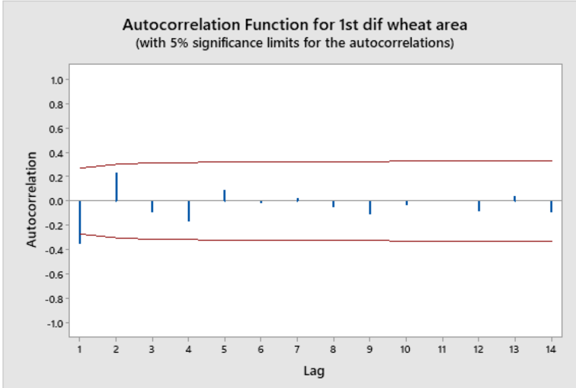
1st difference wheat production



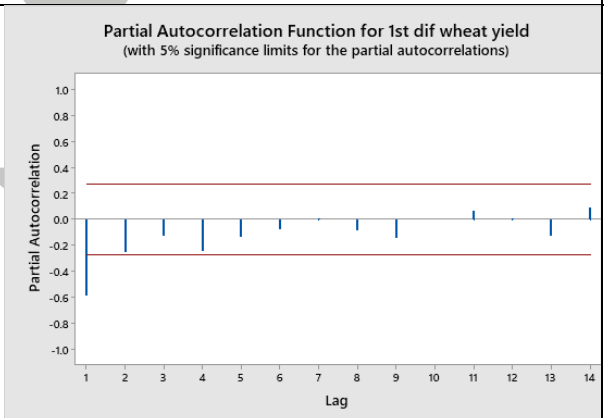
1st difference wheat production



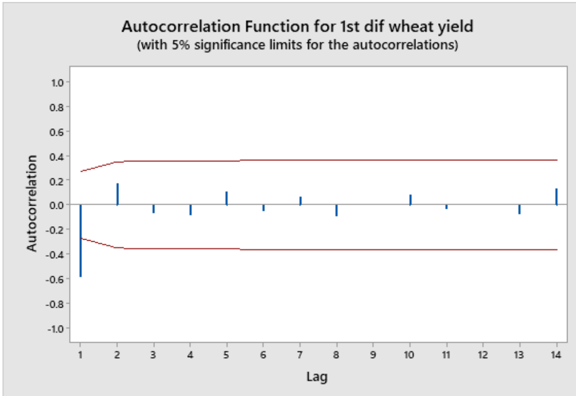
1st difference wheat area



1st difference wheat area



1st difference wheat yield



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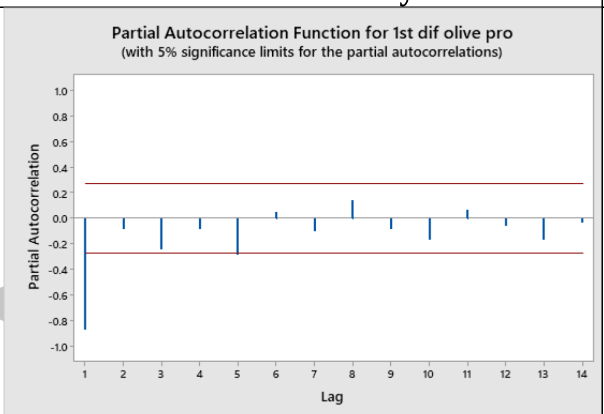
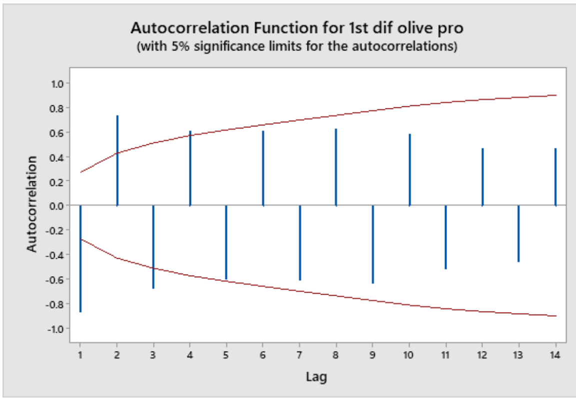


1st difference olive production



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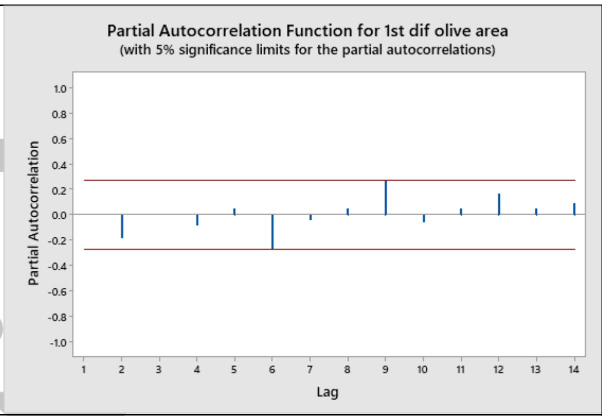
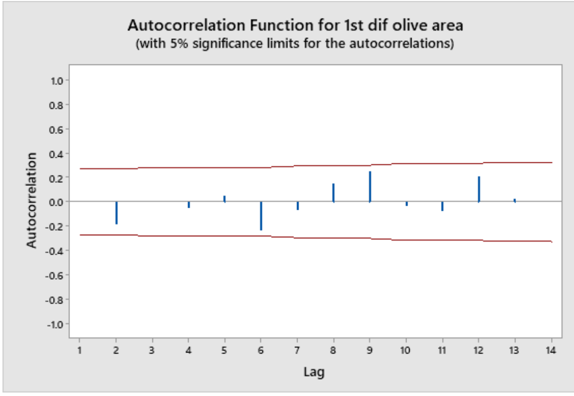
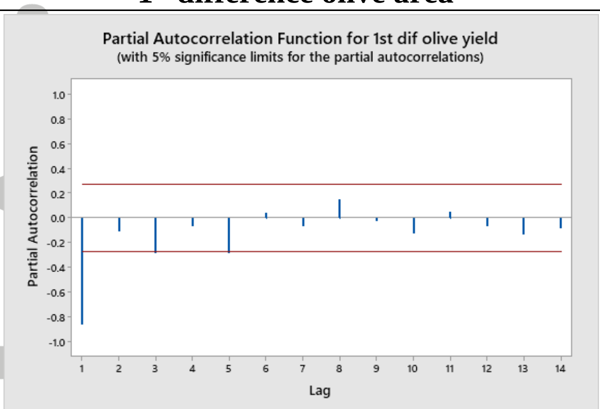


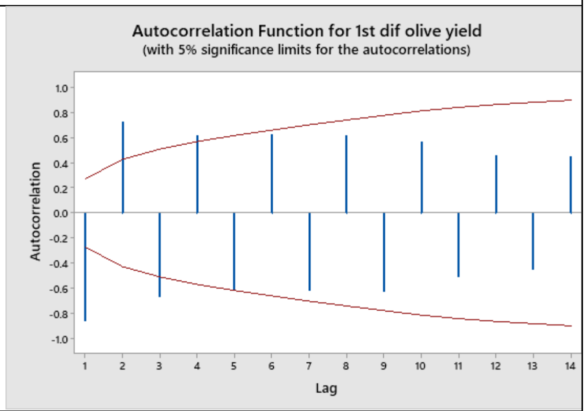
1st difference olive area



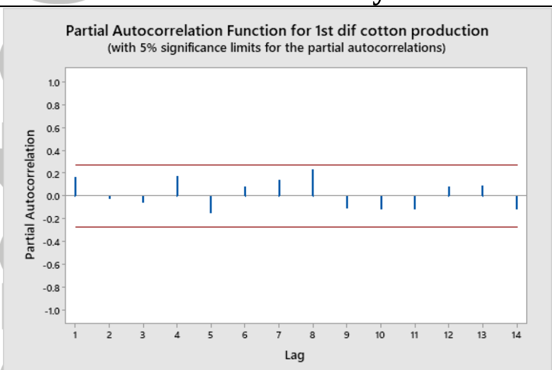
1st difference olive area



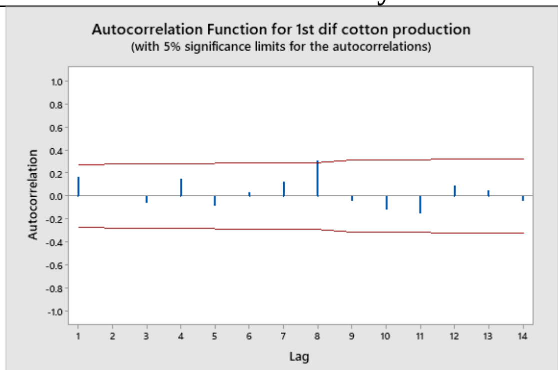
2st difference olive yield



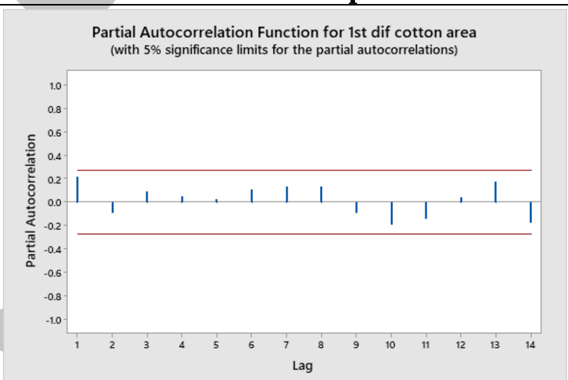
2st difference olive yield



1st difference cotton production



1st difference cotton production



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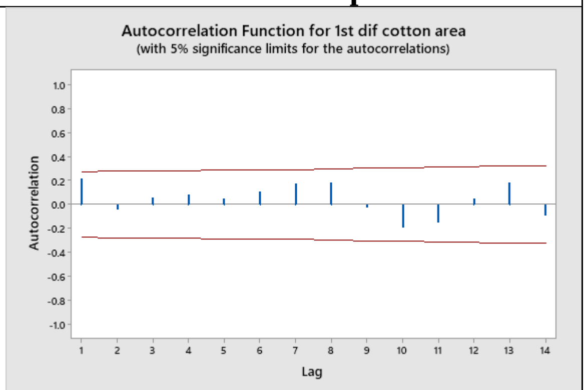
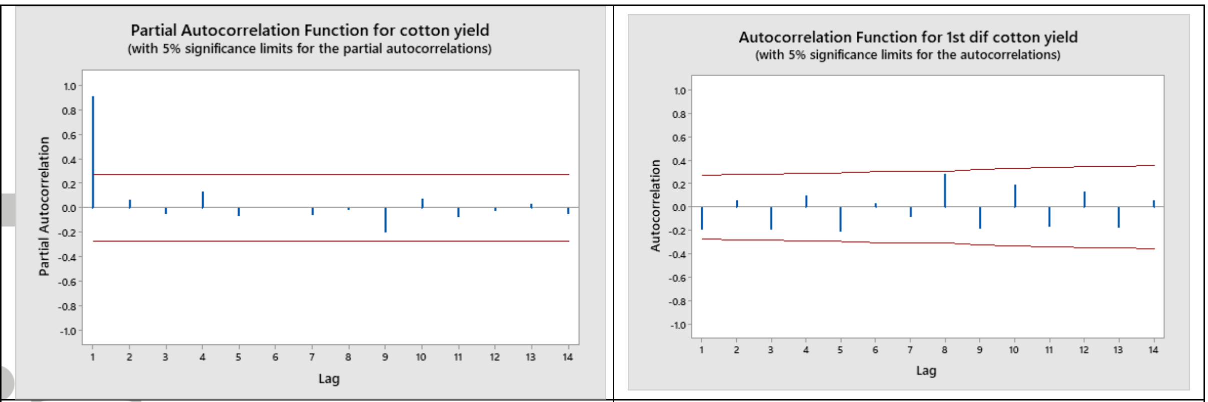


1st difference cotton area



1st difference cotton yield	**1st difference cotton yield**

Fig.2 (PAF) and (PACF) plots for studied series

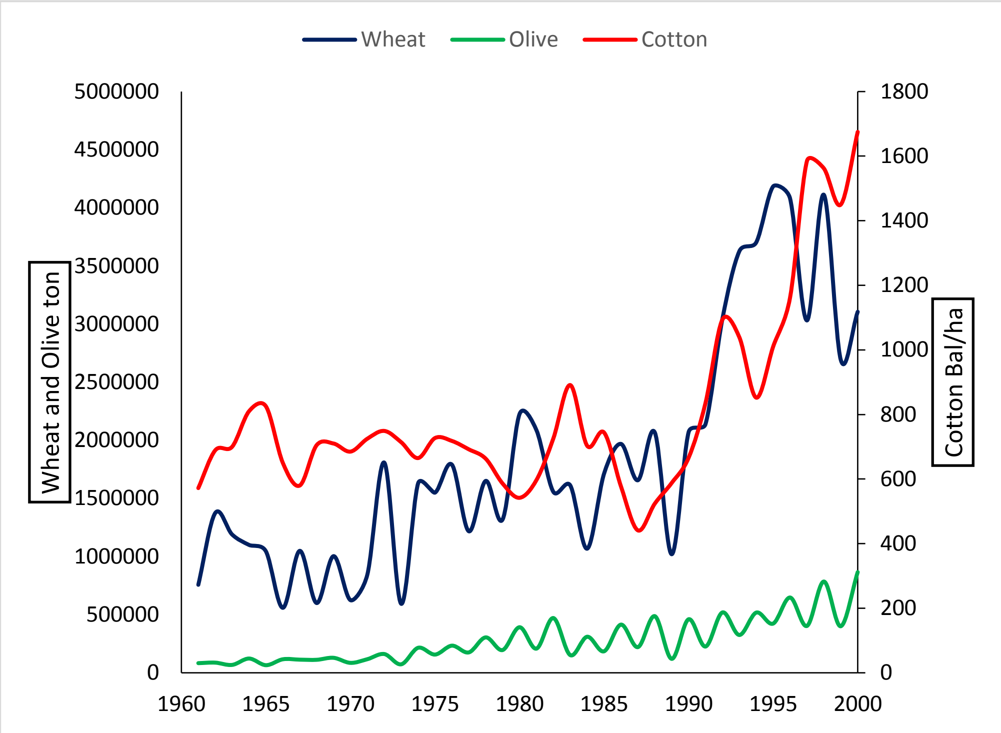


Fig (3) Production of Wheat Olive Cotton in Syria from 1960- 2000

http://www.fao.org/faostat/en/#data/QC

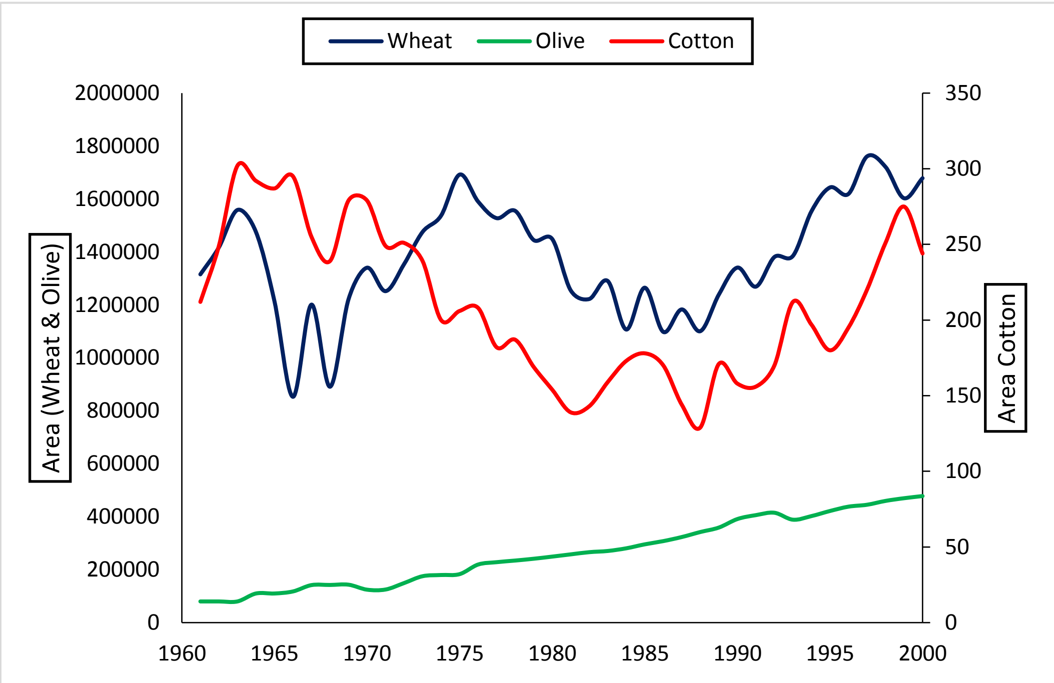


Fig (4) Area cultivated of Wheat Olive Cotton in Syria from 1960- 2000

http://www.fao.org/faostat/en/#data/QC

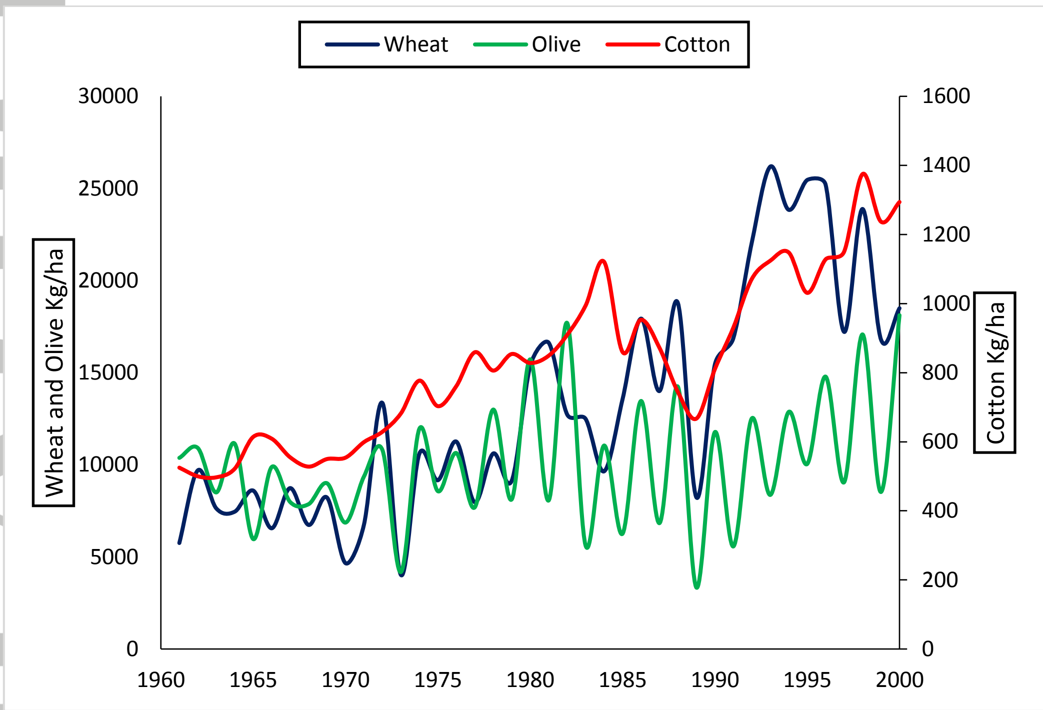


Fig (5) Yield of Wheat Olive Cotton in Syria from 1960- 2000

http://www.fao.org/faostat/en/#data/QC

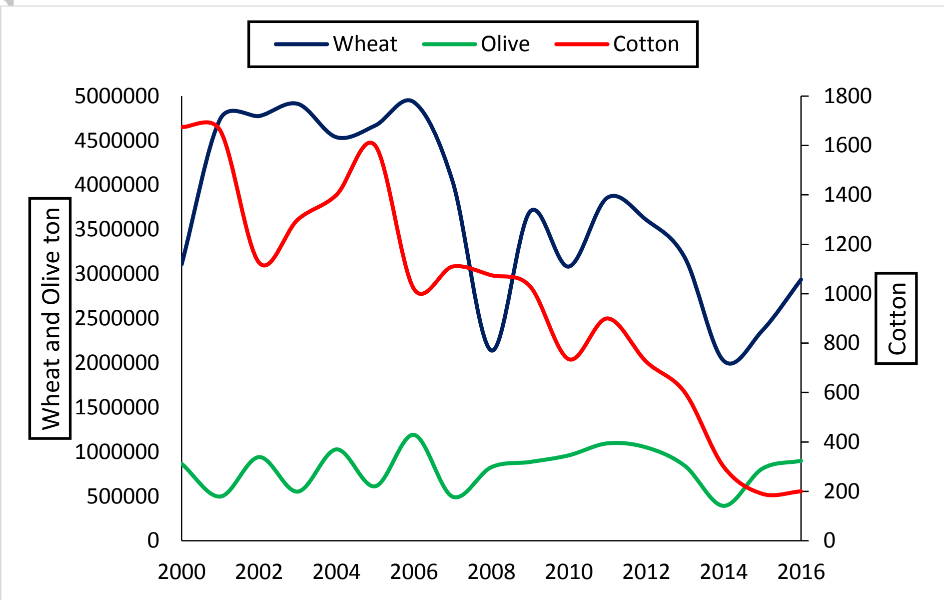


Fig (6) Production of Wheat Olive Cotton in Syria from 2000- 2016

http://www.fao.org/faostat/en/#data/QC

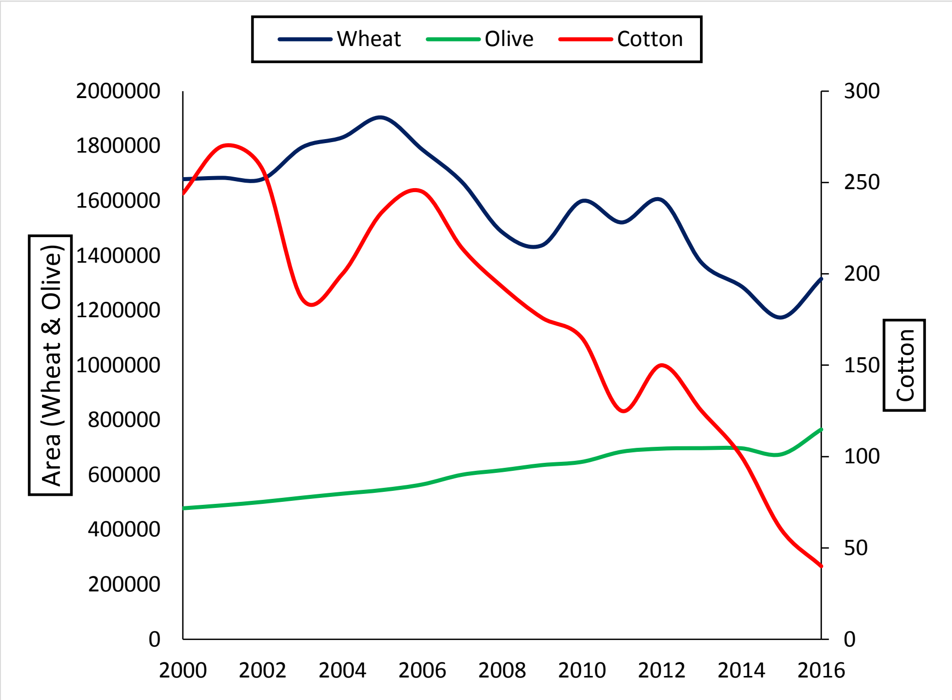


Fig (7) Area cultivated of Wheat Olive Cotton in Syria from 2000- 2016

http://www.fao.org/faostat/en/#data/QC

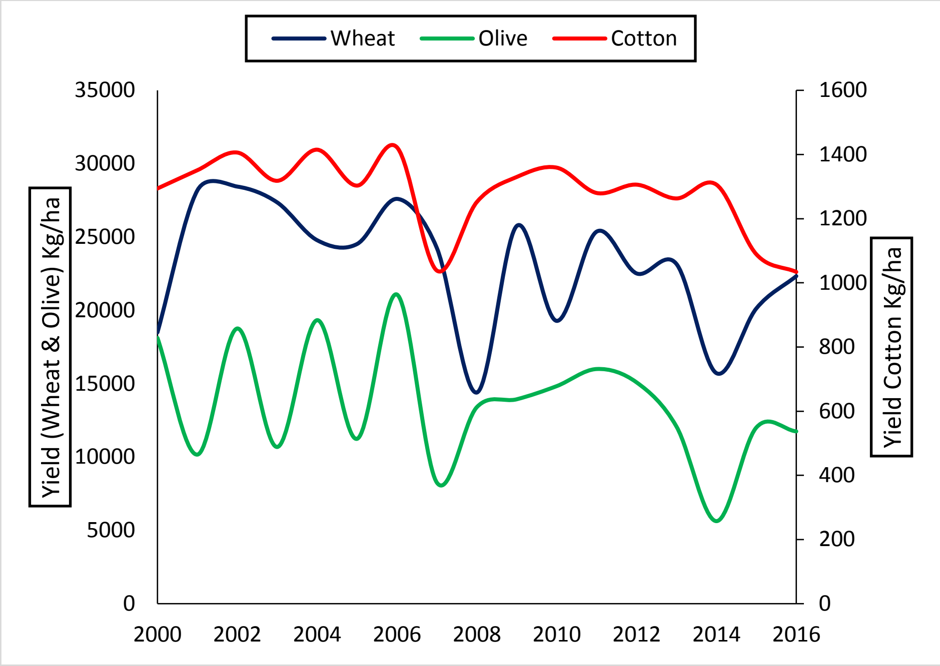


Fig (8) Yield of Wheat Olive Cotton in Syria from 2000- 2016

http://www.fao.org/faostat/en/#data/QC

Table 1: Test for stationarity

Series	Augmented Dickey-Fuller t-statistic	Prob. *
1st difference wheat production	-13.97249	0.000
1st difference wheat area	-10.41040	0.000
1st difference wheat yield	-14.37959	0.000
1st difference olive production	-26.91022	0.000
1st difference olive area	-7.072251	0.000
2st difference olive yield	-6.307767	0.000
1st difference cotton production	-6.149547	0.000
1st difference cotton area	-5.936029	0.000
1st difference cotton yield	-8.748757	0.000

Table (2): ARIMA models for studied crops

	Variables	ARIMA model (p,d,q)	Difference	AR coefficient	MA coefficient	MS value
Wheat	Production	(1,1,0)	1	-0.5825 **	-	0.11048
	Area	(1,1,1)	1	-0.3736 **	0.9769 **	0.013485
	Yield	(1,1,0)	1	-0.5984 **	-	0.09312
Olive	Production	(1,1,1)	1	-0.8665 **	0.9513 **	0.10614
	Area	(1,1,1)	1	0.9987 **	0.9606 **	0.004422
	Yield	(1,2,1)	2	-0.8647 **	0.9524 **	0.10528
Cotton	Production	(1,1,0)	1	0.9993 **	-	0.04036
	Area	(1,1,0)	1	0.9993 **	-	0.02292
	Yield	(1,1,1)	1	-1.0028 **	-0.9514 *	0.015

** significant at confidence level of 99% * significant at confidence level of 95%.

Table (3): USD exchange ratio

year	1 USD TO SP
2012	100
2013	200
2014	300
2015	500
2016	500

Table (4): Total losses of Wheat in local price (2012- 2016)

Year	Production (ton)*	Lost Production((ton)	%	Cost SP/ Ton	Local prices	Profit SP/ton	Loss production value SP	Total Loss $
2012	3609096	249235	6.46	15130	22500	7370	1836861950	18368619.5
2013	3182111	676220	17.53	25570	37000	11430	7729194600	38645973
2014	2024332	1833999	47.53	35870	45000	9130	16744410870	55814702.9
2015	2363630	1494701	38.74	51100	61000	9900	14797539900	29595079.8
2016	2936783	921548	23.88	65650	100000	34350	31655173800	63310347.6
SUM							72763181120	205734722.8

*2011 is the base year; The production in 2011 = (3858331 ton)

http://moaar.gov.sy/main/archives/17612

Table (5): Total losses of Wheat in International price (2012- 2016)

Year	production	Difference	%	Cost (USD/Ton)	World prices (USD/Ton)	Lost production value USD	Total Loss USD
2012	3609096	249235	6.46	151.3	371.36	92555477.85	54846222.35
2013	3182111	676220	17.53	127.85	311.52	210653179.1	124198452.1
2014	2024332	1833999	47.53	119.57	284.45	521678849.4	302393702.3
2015	2363630	1494701	38.74	102.2	232.48	347488559.3	194730117.1
2016	2936783	921548	23.88	131.3	194.88	179593015.7	58593763.35
SUM							734762257.2

https://www.macrotrends.net/2534/wheat-prices-historical-chart-data

Table (6): Total losses of Olive in international price (2012- 2016)

Year	Production ton*	Difference liter	%	Lost Oil	Cost $	World prices	Lost production value $	Total Loss $
2012	1049761	45282	4.14	9056.4	462.9	3630	32874732	11913694.2
2013	842098	252945	23.1	50589	363.1	3955.85	200122495.7	108278166.2
2014	392214	702829	64.18	140565.8	344.97	4234.51	595227285.8	352774708.4
2015	810595	284448	25.98	56889.6	236.64	5045.8	287053543.7	219741769
2016	899435	195608	17.86	39121.6	323.54	4233.44	165618946.3	102331934
SUM								795040271.7

* Production in 2011 = (671668) (5 KG olive produce =l1 liter -kg- olive oil)

https://www.indexmundi.com/commodities/?commodity=olive-oil&months=60

(www.restaurantbusinessonline.com/taking-mystery-out-olive-oil)

Table (7): Total losses of Cotton in local price (2012- 2016)

Cotton	Production ton	Difference ton	%	Cost SP/ton	Local prices SP	Profit SP/ton	Loss production value SP	Total Loss $
2012	592653	79015	11.76	40770	51000	10230	808323450	8083234.5
2013	169094	502574	74.82	77720	100000	22280	11197348720	55986743.6
2014	162439	509229	75.82	87640	110000	22360	11386360440	37954534.8
2015	130497	541171	80.57	131770	140000	8230	4453837330	8907674.66
2016	40696	630972	93.94	190230	235000	44770	28248616440	56497232.88
SUM							56094486380	167429420.4

Production in 2011 = (671668 ton) http://moaar.gov.sy/main/archives/17612

Table (8): Total losses of Cotton in international price (2012- 2016)

Year	Production ton	Difference ton	%	Cost (USD/Ton)	World prices (USD/Ton)	Lost production value USD	Total Loss USD
2012	592653	79015	11.76	407.7	1967.41	155454650.9	123240235.4
2013	169094	502574	74.82	388.6	1993.42	1001841767	806541510.7
2014	162439	509229	75.82	292.13	1831.82	932817104.6	784054339.4
2015	130497	541171	80.57	263.54	1552.28	840046784.6	697426579.2
2016	40696	630972	93.94	380.46	1636.49	1032581076	792521469.3
SUM							3203784134

https://www.statista.com/statistics/259431/global-cotton-price-since-1990/