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Economic Analysis of Soybean: Case of Egypt and Spain

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ABSTRACT

Soybean is used as the main source of protein in many countries. The study aims to analyze the production, area and yield of soybean in Egypt during 2000-2013 and compare it with Spain. The regression analysis is used in this study. Results show that Soybean area in Egypt is significant at 1%.

INTRODUCTION

Soybean is an important global crop, which is a main ingredient in a quarter of vegetable oils and more than a half of oily flours of the world (Barona, 2007). Today, in many countries soybean is used as the main source of protein instead of meat, eggs or cheese. Soy oil is also used in domestic foods and as meal to support the poultry industry (Dross, 2004). The world production of soybeans is dominated by five countries; United States, Brazil, Argentina, China and India which collectively meet the supply for the majority of world soybean demand (FAOSTAT, 2005). Soybean requires well-drained and fertile soil, 400 to 500 mm of precipitation in a season for a good crop, and it can be grown throughout the year in the tropics and subtropics, if water is available. High moisture requirement is critical at the time of germination, flowering and pod forming stage (UNCTAD, 2016). Soybean meal is the major protein source in animal feed production. Soybean meal is primarily used in the formulation of animal feed for the poultry, aquaculture and dairy sectors. The increase in soybean meal production is mainly attributed to ongoing expansion in the crushing industry due to high demand for feed (Wally, 2016).

Problem and Objective

The production of soybean in Egypt shows a decreasing in some years (2000-2013). The aim of the study is to analyze the production, area and yield of soybean in Egypt during 2000-2013 and compare it with Spain.

Methodology

In the simple regression model, the dependent variable is assumed to be a function of one or more independent variables plus an error introduced to account for all other factors (Pepinsky and Tobin, 2003). The goal of regression analysis is to obtain estimates of the unknown parameters β_1 and β_k which indicate how a change in one of the independent variables affects the values taken by the dependent variable. In the regression equation

$$Y_i = \beta_0 + \beta_1 X_{1i} + \beta_k X_{ki} + \varepsilon_i \, ,$$

Y_i is the dependent variable (soybean production), X_{i1} and X_{ik} are the independent or explanatory variables (area and seed), and ε_i is the disturbance or error term.

RESULTS AND DISCUSSION

Table and figure (1) show the production of soybean in Egypt and Spain in 2000-2013. The soybean production in Egypt has its minimum value (10518 ton) in 2000, and in Spain (394 ton) in 2004, while soybean production in Egypt has its maximum value (51000 ton) in 2005 and in Spain it (6677 ton) in 2000. The mean of soybean production in 2000-2013 for Egypt is 28451.14 ton and for Spain is 2199.57 ton. At 2000-2013 the annual average percentage growth rate is 9.13% for Egypt and is declining for Spain (-11.32%).

Table 1. Production of Soybean in Egypt and Spain at 2000-2013.

Year	Soybean Production in Egypt (Ton)	Soybean Production in Spain (Ton)
2000	10518	6677
2001	14885	6637
2002	17691	1600
2003	28681	623
2004	43425	394
2005	51000	2797
2006	23020	1519
2007	25607	920
2008	29169	748
2009	22436	2767
2010	43342	1812
2011	29785	1700
2012	26000	1200
2013	32757	1400
Mean	28451.14	2199.57
Rate[a]	9.13	-11.32

Sources: Own elaboration and FAOSTAT
(a) Annual average percentage growth rate at 2000-2013

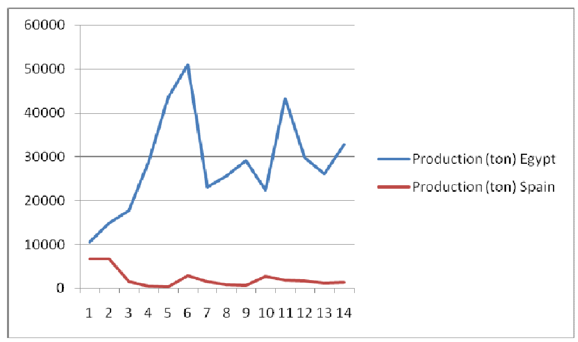

Fig. 1. Production of Soybean in Egypt and Spain at 2000-2013.
Source: Own elaboration

Table and figure (2) show the soybean area in Egypt and Spain during the time period 2000-2013. For soybean area the minimum value in Egypt is 3867 hectare in 2000 and in Spain is 148 hectare in 2004, while 15233 hectare is the maximum value of soybean area in Egypt in 2010 and in Spain is 3053 hectare in 2000. For 2000-2013, the mean of soybean area in Egypt is 8947.14 hectare while in Spain is 900.79 hectare. The annual average percentage growth rate at 2000-2013 for Egypt is 7.09% and for Spain is declining -12.99%.

Table 2. Area of Soybean in Egypt and Spain at 2000-2013.

Year	Soybean Area in Egypt (Hectare)	Soybean Area in Spain (Hectare)
2000	3867	3053
2001	5331	2477
2002	5916	600
2003	8292	272
2004	14348	148
2005	15000	1123
2006	7470	630
2007	7788	344
2008	8681	251
2009	7179	1247
2010	15233	766
2011	9548	700
2012	7185	500
2013	9422	500
Mean	8947.14	900.79
Rate[a]	7.09	-12.99

Sources: Own elaboration and FAOSTAT

(a) Annual average percentage growth rate at 2000-2013

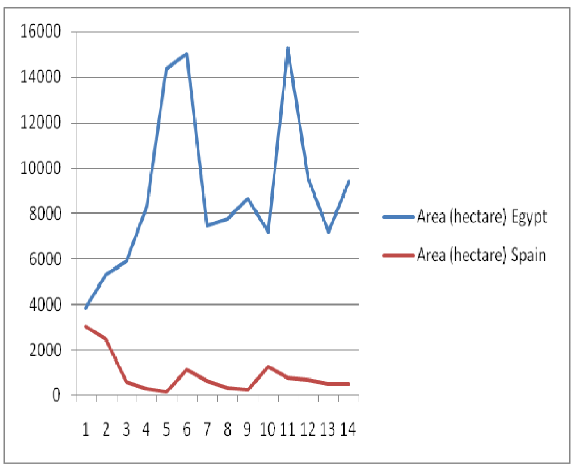

Fig. 2. Area of Soybean in Egypt and Spain at 2000-2013.
Source: Own elaboration

Table and figure (3) show the soybean seed in Egypt and Spain at 2000-2013. In 2000 the minimum value of soybean seed in Egypt is 240 ton and in Spain is 7 ton in 2003, while 685 ton is the maximum value of soybean seed in Egypt in 2009 and in Spain is 300 ton in 2000. In Egypt 411.14 ton is the mean of soybean seed at 2000-2013 while in Spain is 82.71 ton. At 2000-2013 the annual average percentage growth rate for Egypt is 3.17% and for Spain is declining (-8.85%).

Table and figure (4) show the soybean yield in Egypt and Spain at 2000-2013. In Egypt the minimum value of soybean yield is 2.72 ton/hectare at 2000 and in Spain it is 2.19 ton/hectare at 2000, while in Egypt the maximum value of soybean yield is 3.62 ton/hectare at 2012 and in Spain is 2.98 ton/hectare at 2008. For 2000-2013 the mean of soybean yield in Egypt is 3.16 ton/hectare and in Spain is 2.52 ton/hectare. The annual average percentage growth rate at 2000-2013 for Egypt is 1.91% and for Spain is declining (1.92%).

Table 3. Soybean Seed in Egypt and Spain at 2000-2013.

Year	Soybean Seed in Egypt(Ton)	Soybean Seed in Spain(Ton)
2000	240	300
2001	266	63
2002	373	14
2003	646	7
2004	675	55
2005	336	55
2006	350	43
2007	391	31
2008	323	150
2009	685	90
2010	430	90
2011	321	80
2012	360	90
2013	360	90
Mean	411.14	82.71
Rate[a]	3.17	-8.85

Sources: Own elaboration and FAOSTAT

(a) Annual average percentage growth rate at 2000-2013

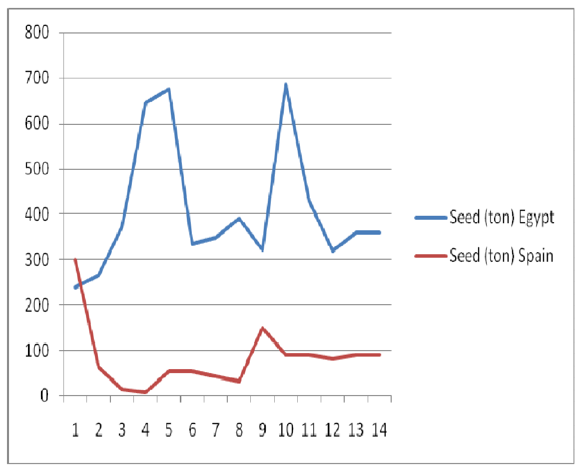

Fig. 3. Soybean Seed in Egypt and Spain at 2000-2013.
Source: Own elaboration

Table 4. Yield of Soybean in Egypt and Spain at 2000-2013.

Year	Soybean Yield in Egypt (Ton/Hectare)	Soybean Yield in Spain (Ton/Hectare)
2000	2.72	2.19
2001	2.79	2.68
2002	2.99	2.67
2003	3.46	2.29
2004	3.03	2.66
2005	3.40	2.49
2006	3.08	2.41
2007	3.29	2.67
2008	3.36	2.98
2009	3.13	2.22
2010	2.85	2.37
2011	3.12	2.43
2012	3.62	2.40
2013	3.48	2.80
Mean	3.16	2.52
Rate[a]	1.91	1.92

Sources: Own elaboration and FAOSTAT

(a) Annual average percentage growth rate at 2000-2013

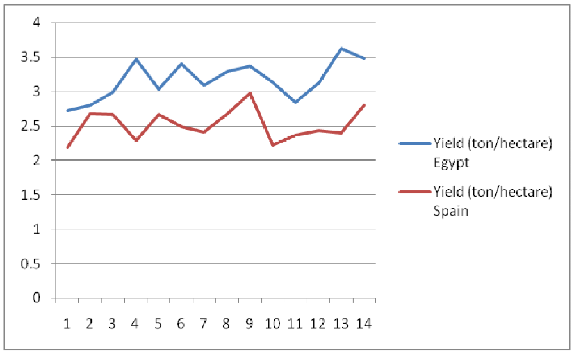

Fig. 4. Yield of Soybean in Egypt and Spain at 2000-2013.
Source: Own elaboration

Table (5) shows the analysis results of soybean production in Egypt at 2000-2013. R^2 equal 0.962, this means that about 96.2 % of the variance in the production of soybean in Egypt is explained by area and seed. Durbin-Watson value at 1% level of significance equal 1.516 this value lies between lower (0.905) and upper (1.551) limit, conclude that there is inconclusive evidence regarding the presence or absence of autocorrelation between the independent variables. F-Statistic value is 140.873 and it is higher than F-tab, since F-Statistic higher than F-tab value, means that the regression model fits the data at 1% level of significance, and the area and seed affect the soybean production in Egypt. The area of soybean in Egypt is significant 1%. Regression coefficient of this variable is 1.056 this result means that 1% increase in area of soybean resulted in an increase in the soybean production in Egypt by 1.056%. Seed is not significant; means that there is no impact from the seed on the soybean production.

Table 5. Analysis Results of Soybean Production in Egypt at 2000-2013.

Variable	Coefficient/Value	Std.Error	t-Statistic
Constant	0.42	0.621	0.676
Area	1.056	0.071	14.939
Seed	0.038	0.085	0.442
R-Square	0.962		
Durbin-Watson	1.516		
F-Statistic	140.873		

Source: Own elaboration

Table (6) shows the analysis results for soybean production in Spain at 2000-2013. R^2 is 0.990, this means that about 99% of the variance in the soybean production in Spain is explained by area and seed. Durbin-Watson value at the level of significance 1% is 2.082 this value higher than the upper limit (1.551), conclude that there is no autocorrelation between the independent variables. F-Statistic value is 562.648 this value higher than the F-tab value, since F-Statistic higher than F-tab, means that the regression model fits the data at 1% level of significance, and the area and seed affect the soybean production in Spain. The area of soybean in Spain is significant at 1%. The regression coefficient of this variable is 0.943 this result means that 1 percent increase in area of soybean resulted in an increase in the production of soybean in Spain by 0.943%. Seed is not significant; means that there is no impact from the seed on soybean production.

Table 6. Analysis Results of Soybean Production in Spain at 2000-2013.

Variable	Coefficient/Value	Std.Error	t-Statistic
Constant	1.215	0.187	6.489
Area	0.943	0.031	30.219
Seed	0.018	0.028	0.626
R-Square	0.990		
Durbin-Watson	2.082		
F-Statistic	562.648		

Source: Own elaboration

CONCLUSION AND RECOMMENDATION

Today, in many countries soybean is used as the main source of protein instead of meat, eggs or cheese. The aim of the study is to analyze the production, area and yield of soybean in Egypt at 2000-2013 and compare it with Spain. At this study the regression analysis is used. The mean of soybean production for the time period 2000-2013 in Egypt is 28451.14 ton and the annual average percentage growth rate is 9.13%, while the mean of soybean area is 8947.14 hectare and the annual average percentage growth rate is 7.09%. Soybean area in Egypt is significant at 1% and its regression coefficient is 1.056 this result means that 1% increase in soybean area resulted in an increase in soybean production in Egypt by 1.056%. The study recommends increasing the area of soybean production; increasing the research with the purpose of taking advantage of genetic improvements, which should enable the introduction of new varieties with higher productivity and quality; government policy should prevent the conversion of farmland into nonagricultural uses, through the strict implementation of different laws and regulations.

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تحليل إقتصادي لفول الصويا في مصر وإسبانيا

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في كثير من البلدان يستخدم فول الصويا كمصدر رئيسي للبروتين بدلا من اللحوم والبيض أو الجبن. تهدف الدراسة إلى تحليل إنتاج ومساحة وإنتاجية فول الصويا في مصر خلال الفترة ٢٠٠٠-٢٠١٣ ومقارنتها مع إسبانيا. بلغ متوسط إنتاج فول الصويا خلال الفترة ٢٠٠٠-٢٠١٣ في مصر ٢٨٤٥١.١٤ طن ومعدل النمو السنوي السنوي ٩.١٣٪ في حين بلغ متوسط مساحة فول الصويا ٨٩٤٧.١٤ هكتار وبلغ متوسط معدل النمو السنوي ٧.٠٩٪. تشير النتائج إلى أن مساحة فول الصويا في مصر معنوي عند مستوى معنوية ١٪، إن معامل الانحدار لهذا المتغير يساوي ١.٠٥٦ هذه النتيجة تشير إلى أن زيادة ١٪ في مساحة فول الصويا تؤدي إلى زيادة في إنتاج فول الصويا في مصر بنسبة ١.٠٥٦ في المئة. توصي الدراسة بزيادة مساحة إنتاج فول الصويا؛ زيادة البحوث بغرض الاستفادة من التحسينات الجينية، التي ينبغي أن تمكن من إدخال أصناف جديدة ذات إنتاجية أعلى ونوعية أعلى؛ ينبغي أن تمنع السياسة الحكومية تحويل الأراضي الزراعية إلى استخدامات غير زراعية، من خلال التنفيذ الصارم لمختلف القوانين واللوائح.