The Economic Impacts of using Wheat Recommended Technology Package in Al Sharkia Governorate

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1. Introduction

Wheat is the most important cereal crop in Egypt due to its importance in the Egyptian diet. Wheat is considered the major staple food commodity for the Egyptian increasing population. The local wheat production does not cover the domestic consumption and consequently, boosting wheat local production is a national goal to narrow the gap between consumption and production and improve food security. This target can be achieved by means of raising the productivity through using the recommended technology packages including using improved agro-techniques and growing high yielding varieties. Besides, among all Egyptian governorates, Al Sharkia Governorate ranks the first in terms of average wheat cultivated area and production (MALR, 2015). Hence, using the package in this Governorate can potentially increase Egypt's production of wheat. It is within this framework that the current study was carried as part of the activities of "Enhancing Food Security in Arab Countries Project (EFSAC-Egypt) - Phase II" jointly implemented by the team of work from the Agricultural Research Centre of Egypt (ARC) and the International Center for Agricultural Research in the Dry Areas (ICARDA).

1.1. Research problem

Despite recent impressive gains in local wheat production, Egypt remains the world's largest wheat importer due to increasing wheat domestic consumption resulting in low self-sufficiency and leaving Egyptian food security vulnerable to swings in international wheat prices. Indeed, this situation negatively affects food trade balance. As a result, there is a need to increase the total production of wheat through using the recommended technology package for wheat. These discussions raised some important research questions on:

- How does using the recommended technology package affect the economic efficiency and production function of wheat?;
- How does the dissemination of this package affect the local production of wheat, self-sufficiency of wheat, wheat imports, the cultivated area, water consumption, farmer's income, net agricultural income)?; and
- What do farmers think about using the package and what are the problems they faced?

1.2. Research objectives

The study therefore attempts to investigate the current situation of wheat area, productivity, production, consumption and self-sufficiency; measure the impact of using the technology package on the economic efficiency and production function of wheat; estimate the impact of disseminating this package on some economic variables (e.g. the local production of wheat, self-sufficiency of wheat, wheat imports, the cultivated area, water consumption, farmer's income, net agricultural income); and finally investigate farmer's perception about using this package and identify the problems they faced.

2. Methodological Framework

2.1. Data source and descriptive analysis

Surveying procedure and data collection: Data was collected from a socio-economic survey conducted during winter season of 2014/2015 in Al Sharkia Governorate. A sample of 200 wheat farmers was selected from the target Site (nine districts). Moreover, the target groups were the demonstration farmers (demo farmers) who used the technology package recommended by the Project for three years and their neighboring farmers.

The distribution of respondents across the defined nine districts (clusters) was determined based on the weight proportional importance of the total number of holders in each district. The sample was stratified based on the type of farmers (demo and neighboring), to ensure the representativeness of each type. Interviewed farmers were randomly selected using lists obtained from census offices. The demo farmers represented only a half of the sample.

2.2. Analytical method

To reach the objectives of this study, frequency tables representing absolute frequency and relative frequency (or percent) and quantitative methods of analysis were used. Data was also used to estimate wheat production function. Besides, the main indicators of economic efficiency for wheat grown in the study area were calculated. The forms of these indicators are represented in the following formulas:

- *Total revenue per ton of grains (in LE)=Total revenue (LE/fed)÷Yield of grains (ton/fed)*
- *Variable costs per ton of grains (in LE)=Variable costs (LE/fed)÷Yield of grains (ton/fed)*
- *Total costs per ton of grains (in LE)=Total costs (LE/fed)÷Yield of grains (ton/fed)*
- *Gross margin per fed (in LE)=Total revenue (LE/fed)-Variable costs (LE/fed)*
- *Gross margin per ton of grains (in LE)=Gross margin per fed (LE)÷yield of grains (ton/fed)*
- *Net profit per fed (in LE)=Total revenue (LE/fed)-Total costs (LE/fed)*
- *Net profit per ton of grains (in LE)=Net profit per fed (LE)÷Yield of grains (ton/fed)*
- *Benefit/Cost ratio (in LE)=Total Revenue per fed (LE)÷Total Costs per fed (LE)*
- *Farmer incentive (%)=[Net profit per ton of grains (LE)÷Farm-gate price of grains (LE/ton)]X100*

3. Results and Discussion

3.1. The current situation of wheat production and consumption in Egypt

Geographical distribution of wheat production: Table 1 showed that the total wheat area cultivated in Al Sharkia, Al Behaira, Al Dakahlia, Kafr El Sheikh, Minya, and Assuit Governorates reached about 1.74 million feddans, representing about 53% of Egypt's wheat area during the period (2012-2014). Besides, Al Sharkia Governorate ranks the first in terms of average wheat cultivated area and production during that period, reaching about 427 thousand feddans and 1138 thousand tons, respectively. This revealed that Al Sharkia Governorate solely contributes to about 12.4% of the local wheat production.

Table 1: Geographical distribution of wheat grown in Egypt during the period (2012-2014).

Governorate	Cultivated Area		Productivity		Total Production	
	Thousand feddans	% of Total	Ton/feddan	Difference from the Total	Thousand tons	% of Total
Al Sharkia	**427**	**12.9**	**2.66**	**-0.11**	**1138**	**12.4**
Al Behaira	340	10.3	2.92	+0.15	995	10.8
Al Dakahlia	299	9.0	2.89	+0.11	863	9.4
Kafr El Sheikh	241	7.3	2.68	-0.09	645	7.0
Minya	230	7.0	2.90	+0.12	667	7.3
Assuit	205	6.2	2.81	+0.04	577	6.3
Fayoum	193	5.8	2.76	-0.01	534	5.8
Sohag	180	5.4	2.76	-0.02	496	5.4
Al Gharbia	155	4.7	2.96	+0.19	459	5.0
Beni Seuf	136	4.1	2.84	+0.07	387	4.2
Menoufia	136	4.1	3.24	+0.47	441	4.8
Others	769	23.2	2.57	-0.20	1976	21.6
Total	**3311**	**100**	**2.77**	**0.00**	**9178**	**100**

Source: compiled and calculated from MALR, (2012-2014).

Cultivated area, productivity and total production of wheat: Table 2 revealed that the area cultivated by wheat in Egypt increased at a statistically significant annual rate of about 71 thousand feddans, representing about 2.5% of the annual change during this period reaching about 2.88 million feddans during the period (2000-2014). Besides, the total production of wheat in Egypt increased at a significant annual rate of about 198 thousand tons, representing about 2.5% of the annual change reaching about 7.79 million tons whereas, wheat productivity in Egypt rotated around an average of 2.71 ton/feddan.

At Al Sharkia Governorate, the total area of wheat increased at a statistically significant annual rate of 12 thousand feddans (3.4% of the annual change) whilst, its total production increased at a statistically significant annual rate of 27 thousand tons (2.9%) and wheat productivity reached an average of 2.65 ton/feddan.

Table 2: The progress of some indicators for wheat grown in Egypt and in Al Sharkia Governorate during the period (2000-2014).

		Change (β)	T-statistic	P-value	Mean (µ)	Annual change (%)[1]
Egypt	Cultivated area (thousand feddan)	71	9.2*	4.5E-07	2875	2.5
	Productivity (ton/feddan)	0.002	0.34	0.74	2.71	-
	Production (thousand ton)	198	6.62*	1.7E-05	7788	2.5
	Domestic consumption (thousand ton)	430	9.4*	3.5E-07	13280	3.2
	Self-Sufficiency Rate (SSR) %	-0.42	-1.45	0.17	58.6	-
Al Sharkia Gover.	Cultivated area (thousand feddan)	12	6.5*	3.1E-08	359	3.4
	Productivity (ton)	-0.01	-1.6	0.138	2.65	-
	Total production (thousand ton)	27	11.6*	1.9E-05	952	2.9

Note: (*) indicates statistical significant difference at the 5% level. (1) calculated as (β÷µ) X 100
Source: compiled and calculated from Table (1) in the annexes.

Domestic consumption and self-sufficiency of wheat: Table 2 illustrated that the domestic consumption of wheat increased at a statistically significant annual rate of about 430 thousand tons, representing about 3.2% of the annual change reaching about 13.28 million tons during the period (2000-2014) whereas, the self-sufficiency rate of wheat reached an average of 58.6%.

3.2. Characteristics of selected sample

Table 3 revealed that the demo farmers were relatively younger than the neighboring farmers. Besides, about 69% of the demo farmers got farming experience more than 20 years as compared to about 72% for the neighboring farmers. The demo farmers were higher-educated than their neighbors. Moreover, about 27% and 36% of the demo and neighboring farmers cultivated less than two feddans, respectively whereas, about 55% and 53% of them cultivated about 2-5 feddans, respectively. About 18% and 11% of the demo and neighboring farmers cultivated more than five feddans, respectively.

Table 3: Farmer's characteristics in the study sample.

Characteristics	Demo Farmers		Neighboring Farmers		Overall	
	Frequency	%	Frequency	%	Frequency	%
Age	**100**	**100**	**100**	**100**	**200**	**100**
< 45 years	12	12	9	9	21	10.5
45 – 55 years	39	39	24	24	63	31.5
> 55 years	49	49	67	67	116	58.0
Farming Experience	**100**	**100**	**100**	**100**	**200**	**100**
< 20 years	31	31	28	28	59	29.5
20 – 30 years	20	20	47	47	67	33.5
> 30 years	49	49	25	25	74	37.0
Level of Education	**100**	**100**	**100**	**100**	**200**	**100**
Illiterate	15	15	30	30	45	22.5
Can Read & Write	37	37	26	26	63	31.5
Prim. & Prep. School	2	2	1	1	3	1.5
High School Graduates	19	19	25	25	44	22
University Graduates	27	27	18	18	45	22.5
Farm Size	**100**	**100**	**100**	**100**	**200**	**100**
< 2 feddan	27	27	36	36	63	31.5
2 – 5 feddan	55	55	53	53	108	54
> 5 feddan	18	18	11	11	29	14.5

Source: The results of the survey 2014/2015.

3.3. The components of the recommended technology package

The components of the technology package recommended by the Project (Phase I) for wheat in Al Sharkia Governorate included using improved wheat varieties, seed rate (45 kg/fed), planting date (15-30 November), planting method (raised-bed with different types), nitrogenous fertilization (75 kg/fed), and phosphate fertilization (15 kg/fed).

3.4. The impact of using the recommended technology package on the indicators of economic efficiency for wheat grown in the study area

Yield: Table 4 showed statistical significant effect of using the recommended technology package on the yield of wheat grown in the study Site. The average grain yield of wheat for the demo farmers exceeds that cultivated by their neighbors by about 11.3% since it reached about 3.50 and 3.15 ton/fed for both types of farmers, respectively.

Costs of production: The results showed statistical significant effect of using the package on the variable and total costs for wheat grown in the demo and neighboring farms. The variable and total costs of wheat grown in the demo farms were relatively higher than that for the neighbors by about 3.3% and 2.1%, respectively (Table 4).

Table 4: Indicators of economic efficiency of wheat grown in the study area.

Indicator	Demo Farmers	Neighboring Farmers	Change Value	(%)	T-statistic
Grain yield (ton/fed.)	3.502	3.148	+0.354	11.3	9.4*
Farm-gate Price (LE/ton of grains)	2749	2749	0	0	
Straw yield (ton/fed.)	3.003	2.837	+0.166	5.8	2.96*
Farm-gate Price (LE/ton of straw)	489	489	0	0	
Total Revenue per fed. (LE)	11095	10040	+1055	10.5	9.99*
Fixed Costs (LE/fed.)	3221	3221	0	0	
Variable Costs (LE/fed.)	5846	5660	+186	3.3	3.6*
Total Costs (LE/fed.)	9067	8881	+186	2.1	3.6*
Gross Margin per fed. (LE)	5249	4380	+869	19.8	7.4*
Net Profit per fed. (LE)	2029	1159	+869	75	7.4*
Variable Costs per ton of grains (LE)	1673	1815	-142	-7.8	-5.5*
Total Costs per ton of grains (LE)	2596	2848	-25.2	-8.9	-7.4*
Total Revenue per ton of grains (LE)	3170	3194	-24	-0.8	-3.2*
Gross Margin per ton of grains (LE)	1497	1379	+118	8.5	4.8*
Farmer Incentive (%)	20.9	12.6	+8.3	66	7.0*
Net Profit per ton of grains (LE)	574	346	+228	66	7.0*
Benefit/Cost Ratio (LE)	1.23	1.13	+0.09	8.2	6.7*

Note: (*) indicates statistical significant difference at the 5% level.
Source: The results of the survey 2014/2015.

Total revenue per feddan: Our findings revealed that using the package significantly affected the total revenue of wheat since the demo farms gained about LE 1055 exceeding that gained by their neighbors (10.5%) due to getting higher yield, indicating that demo farmers gained more profits in terms of this indicator.

Gross margin per feddan: Based on Table 4, using the package has a significant positive effect on the gross margin of wheat in favour of the demo farmers since they gained about LE 870 exceeding that gained by their neighbors, representing about 19.8% over that gained by the neighbors, indicating that demo farmers gained more profits.

Net profit per feddan: Table 4 showed that using the package significantly affected the net profit of wheat since the demo farms gained about LE 870 exceeding that gained by the neighbors (75.0%), indicating that demo farmers gained more profits.

Variable and total costs per ton of grains: Table 4 revealed that using the recommended package significantly affected the variable and total costs per ton of wheat grains in favour of the demo farmers since these costs were lower for the demo farms than that of their neighbors by about 7.8% and 8.9%, respectively, indicating that demo farmers gained more profits in terms of this indicator.

Total revenue per ton of grains: Our results showed statistical significant effect of using the package on the total revenue per ton of wheat grains in the demo and neighboring farms. The total revenue per ton of wheat grains in the demo farms were relatively lower than that for the neighbors by about 0.8% (Table 4).

Gross margin per ton of grains: The results revealed that using the package has a significant positive effect on the gross margin per ton of wheat grains in favour of the demo farmers since they gained about 8.5% over that gained by the neighbors, indicating that demo farmers gained more profits in terms of this indicator (Table 4).

The percentage of farmer incentive: Table 4 indicated that using the package significantly affected the percentage of farmer incentive of wheat was in favour of the demo farmers since they gained about 66% exceeding that gained by the neighbors, indicating that demo farmers gained more profits in terms of this indicator.

Net profit per ton of grains: Our findings showed that using the package has a significant positive effect on the net profit per ton of wheat grains in favour of the demo farmers since they gained about 66% over that gained by the neighbors, indicating that demo farmers gained more profits in terms of this indicator (Table 4).

Benefit/Cost ratio (B/C) per feddan: Based on Table 4, using the package has a significant positive effect on the B/C of wheat in favour of the demo farmers, gaining about 8.2% over that gained by the neighbors, making more profits by the demo farmers.

3.5. The impact of using the recommended technology package on the production function of wheat grown in the study area

Data was also used to estimate wheat production function. The production function was specified using a range of variables including seeds, organic manure, chemical fertilizers and labour, and estimated with a set of functional forms including linear, log-linear, log-log (Cobb-Douglas) and quadratic. The functional form that had the best fit for the given data set was estimated with a set of independent variables as given below:

$LnY_i = b_0 + aD + b_1 Ln(X_{1i}) + b_2 Ln(X_{2i}) + b_3 Ln(X_{3i}) + b_4 Ln(X_{4i}) + b_5 Ln(X_{5i}) + U_i$

where:

Y: the yields of wheat (ton/feddan);

D: dummy variable for using the recommended technology package ($D=1$ if using, $D_t=0$ otherwise);

X_1: quantity of seeds in kg/feddan;

X_2: quantity of organic manure in CM/feddan;

X_3: quantity of nitrogenous fertilizers in kg/feddan;

X_4: quantity of phosphorus fertilizers in kg/feddan;

X_5: labour (man-day/feddan);

i: denotes farm; a and b_s: coefficients to be estimated;   *U:* error term.

The estimation results of wheat production function are portrayed in Table 5. The F-value showed statically significance at the 5% level, implying statistical significant positive effect of using the recommended technology package on the yield of wheat grown in the demo farms, as compared to their neighbors in the study Site. Besides, among the range of factors that could possibly affect wheat production, using the package, seeds, chemical nitrogenous fertilizers, and labour are statically significant in the determination of wheat production. However, the positive signs of the coefficients of using the recommended package, nitrogenous fertilizers, and labour indicate that these factors positively affect wheat production function whereas, seed rate (with a negative coefficient) negatively affects wheat production. The primary reason for this negative effect is that the neighboring farmers used larger rate of seeds than the recommended level (for example, owing to late cultivation of wheat), implying that using the recommended seed rate positively affects wheat production. Contrariwise, using organic manure and phosphorus fertilizers have statically insignificant effect on wheat production since it is recommended to use them based on the soil properties.

Table 5: Estimates of the production functions for wheat grown in the study area.

	Coefficient	T-statistic	P-value
Constant	0.218	**6.32***	1.57E-14
D	0.189	**3.952***	0.00011
X_1 (kg/fed)	-0.113	**-2.015***	0.04531
X_2 (m³/fed)	0.025	**1.909**	0.05782
X_3 (kg/fed)	0.106	**2.023***	0.04446
X_4 (kg/fed)	0.012	**0.441**	0.65943
X_5 (man-day/fed)	0.160	**2.763***	0.00629
F-value	**573***		
Adj. R^2	0.91		
E_P (Elasticity of Production)	0.38		
n	200		

Note: (*) indicates statistical significant difference at the 5% level.
Source: The results of the socio-economic farm and household survey 2014/2015.

Furthermore, the elasticity of production is estimated at about 0.38, implying diminishing rates of returns. The adjusted coefficient of determination (adj. R^2) indicated that the studied factors of wheat production explain 91% of the variation in the wheat production whereas, the rest (9%) represents other factors not included in the estimated production function of wheat in the study area such as wheat losses due to pest and/or disease attacks and/or spillage.

3.6. The impact of using the recommended technology package on some economic variables of wheat grown in Al Sharkia Governorate and nationwide

Based on the results revealed by the study, Table 6 revealed that the dissemination of the recommended technology package on wheat produced in Al Sharkia Governorate and over-all Egypt can potentially increase wheat production by about 151 thousand tons in the Governorate and by about 1172 thousand tons at the national level, representing about 12.77% over the production of wheat achieved during the period (2012-2014). This means boosting the local production of wheat to reach about 10.35 million tons nation-wide as compared to the average local production of wheat of about 9.18 million tons achieved during that period thus, releasing an agricultural area of about 335 thousand feddans, representing about 10.11% of the area that was cultivated by wheat during the study period and saving about 630 million cubic meters of irrigation water. However, the released area can be cultivated by other winter crops (e.g. faba bean or lintels) whereas, the saved water can be used to irrigate other areas or winter crops. This in turn, raises the self-sufficiency rate of wheat from about 54.06% achieved during that period to about 59.53% and reduces the value of wheat imports by about USD 0.91 billion from about USD 2.80 billion during the period (2012-2014) to only about USD 1.89 billion, representing about 32.56% less than the average value of wheat imports for the study period thus, positively affecting the deficit in the agricultural trade balance. Besides, the dissemination of this technology package on wheat increases the net revenue of wheat thus, enhancing the income earned by wheat farmers in Al Sharkia Governorate by about L.E. 371 million, and increasing Egypt's net agricultural income by about L.E. 2877 million, representing about 1.40% over Egypt's net agricultural income for the study period of about LE 371billion.

Table 6: The impact of using the recommended technology package on some economic variables of wheat grown in Al Sharkia Governorate and nationwide.

The increase of local production			The released cultivated area		Self-Sufficiency Rate (SSR)%[4]	The reduction of imports		The increase of net agricultural income		
Al Sharkia G.[1]	Egypt[2]							Al Sharkia G.[1]	Egypt[2]	
Quantity (000 ton)	Quantity (000 ton)	%	Area (000 fed)	%[3]		Value (million $)	%[5]	Value (million LE)	Value (million LE)	%[6]
151	1172	12.77	335	10.11	59.53	910.70	32.56	371	2877	1.40

Source: compiled and calculated from: Table 4; CAPMAS, 2015; COMTRADE, 2015; MALR, 2015 a and b.

3.7. Farmer's perception about using the recommended technology package

The demo farmers were asked about their perception after using the recommended technology package. The results showed that the demo farmers reported that the package was useful due to achieving high yield and high quality of grains, saving irrigation time and costs, saving seeds, easy weeding, saving chemical fertilizers, and disease-resistance (e.g. powdery mildew). However, some of the demo farmers skipped some components of the recommended technology package due to low soil fertility and getting insufficient irrigation water supply since their farms are located at the tail-end of the *mesqa*.

Table 7: Responds of the demo farmers about using the recommended technology package for wheat (%).

	%
High yielding	100
High quality of grains	98
Saving irrigation time and costs	95
Saving seeds	89
Easy weeding	30
Saving chemical fertilizers	28
Disease-resistance (e.g. powdery mildew)	17

Source: The results of the survey 2014/2015.

3.8. Farmer's opinion about the main problems they faced while using the recommended technology package

The main problems they faced while using this package were unavailability of raised-bed machines, high costs of production, lack of regular maintenance for the raised-bed machines, lack of chemical fertilizers, poor distribution of wheat improved seeds, and lack of good pesticides (Table 8).

Table 8: Responds of the demo farmers about the problems they faced while using the recommended technology package for wheat.

	%
Unavailability of the raised-bed machines	47
High costs of production	37
Lack of regular maintenance for the raised-bed machines	11
Lack of chemical fertilizers	7
Poor distribution of improved seeds	3
Lack of good pesticides	1

Source: The results of the survey 2014/2015.

4. Concluding remarks, recommendations and policy implications

The primary objectives of this study are to measure the economic impacts of using the recommended technology package of wheat in Al Sharkia Governorate, investigate farmer's perception about using this package, and identify the problems they faced. To reach these objectives, the methodology used was based on the calculation of different economic indicators and the production function for wheat grown in the study area using a 200-farmers socio-economic survey conducted during winter season of 2014/2015 in Al Sharkia Governorate. The target groups were the demonstration farmers (demo farmers) who used the technology package recommended by the Project for three years (100 farmers) and their neighboring farmers (100 farmers).

Our findings revealed that the average grain yield of wheat for the demo farmers exceeds that cultivated by their neighbors by about 11.3% since it reached about 3.50 and 3.15 ton/fed for both types of farmers, respectively and the demo farmers gained more profits in terms of all of the economic efficiency indicators. Besides, the results showed statistical significant positive effect of using the recommended technology package on the production function of wheat grown in the demo farms in the study area. Moreover, disseminating this package has positive potential effect on increasing the local production of wheat, saving irrigation water, raising the self-sufficiency rate of wheat, reducing wheat imports, enhancing the incomes of wheat producers in Al Sharkia Governorate, and increasing Egypt's net agricultural income.

These results confirm that the recommended technology package of wheat is a potential, not only to boost the local production of wheat but also to enhance the incomes of wheat producers in the study area. The demo farmers reported that the package was useful due to achieving high yield and high quality of grains, saving irrigation time and costs, saving seeds, easy weeding, saving chemical fertilizers, and disease-resistance. Therefore, farmers are encouraged to the recommended technology package of wheat in Al Sharkia Governorate. However, the main problems they faced while using this package were lack of raised-bed machines, high costs of production, lack of skilled labour, lack of regular maintenance for the raised-bed machines, lack of chemical fertilizers, and unavailability of wheat improved seeds.

Thus, the study recommends sufficient farmer's access to knowledge and improving communication channels between farmers and agricultural extension and skilled extension personnel to transfer and disseminate the recommended technology package of wheat in Al Sharkia Governorate; re-activating the role of mechanical service stations and agricultural co-operatives by providing them with raised-bed machines; training agricultural extension personnel on operation and maintenance of the raised-bed machines; and providing agricultural co-operatives with adequate seeds of improved wheat varieties at suitable time and affordable prices.

Finally, these recommendations are supported not only by our findings but also by the objectives of the National Agricultural Sustainable Development Strategy 2030 targeting promoting self-sufficiency of the strategic food commodities, reducing poverty rates in the rural areas, and rationalizing water and land use through the introduction of new high-yielding drought-tolerant varieties, introduction of agricultural management technology package in order to improve agricultural production systems (MALR, 2009).

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Annexes:

Annex 1: The progress of some indicators for wheat grown in Egypt and in Al Sharkia Governorate during the period (2000-2014).

Year	Egypt					Al Sharkia Governorate		
	Cultivated area	Productivity	Total production	Domestic consumption	Self-sufficiency rate %	Cultivated area	Productivity	Total production
	(000 fed)	(ton/fed)	(000 ton)	(000 ton)		(000 fed)	(ton/fed)	(000 ton)
2000	2463	2.67	6564	11436	57.4	289	2.64	763
2001	2342	2.67	6254	9931	63.0	271	2.64	716
2002	2451	2.70	6625	11750	56.4	282	2.69	757
2003	2506	2.73	6845	10365	66.0	308	2.87	885
2004	2605	2.76	7178	11099	64.7	308	2.89	890
2005	2935	2.73	8141	12575	64.7	355	2.81	997
2006	3064	2.70	8274	13857	59.7	365	2.83	1032
2007	2716	2.72	7379	13029	56.6	346	2.69	932
2008	2920	2.73	7977	13743	58.0	349	2.54	885
2009	3147	2.71	8523	13316	64.0	418	2.52	1053
2010	3001	2.39	7169	15449	46.4	400	2.32	927
2011	3049	2.75	8371	15038	55.7	404	2.55	1030
2012	3160	2.78	8795	15888	55.4	425	2.69	1145
2013	3378	2.80	9460	15895	59.5	432	2.70	1168
2014	3393	2.73	9262.9	15833	58.5	425	2.59	1100

Source: www.msrintranet.capmas.gov.eg and MALR. (2015 a).

الملخص
الآثار الاقتصادية لاستخدام الحزمة التكنولوجية الموصى بها لمحصول القمح في محافظة الشرقية

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يُعد محصول القمح من أهم محاصيل الحبوب في النمط الغذائي المصري ، لذا تولي الدولة اهتماماً خاصاً بزيادة الإنتاج المحلي منه لمواجهة الزيادة المضطردة في عدد السكان ونمو الاستهلاك المحلي منه ومن ثم زيادة الكميات المستوردة منه لتغطية العجز بين الإنتاج المحلي والاستهلاك المحلي من هذا المحصول الهام. ويستهدف البحث دراسة الآثار الاقتصادية لاستخدام الحزمة التكنولوجية التي يوصي بها مشروع تعزيز الأمن الغذائي لمحصول القمح في محافظة الشرقية ، وذلك لعينةٍ تضم ٢٠٠ من زراع القمح خلال الموسم الزراعي ٢٠١٥/٢٠١٤ ، من بينهم ١٠٠ مزارعاً استخدموا هذه الحزمة (حقول الإرشاد) و ١٠٠ مزارعاً لم يستخدموا هذه الحزمة خلال ذات الموسم (حقول المقارنة).

وقد أشارت النتائج إلى وجود زيادة معنوية احصائياً في إنتاجية محصول القمح من الحبوب في الحقول الإرشادية تُقدر بنحو ١١,٣% فوق الإنتاجية المحققة في حقول المقارنة ، وهو ما انعكس إيجابياً على تحقيق زراع الإرشاد لأرباح تفوق نظيرتها في حالة حقول المقارنة. وبدراسة دالة إنتاج محصول القمح المتضمنة متغير صوري لاستخدام الحزمة التكنولوجية الموصى بها ، فقد ثبتت المعنوية الإحصائية لأثر تطبيق الحزمة التكنولوجية على إنتاجية المحصول.

وتبين أن تعميم استخدام الحزمة التكنولوجية الموصى بها لمحصول القمح في محافظة الشرقية وعلى مستوى الجمهورية يحقق زيادة في الإنتاج المحلي من هذا المحصول على مستوى المحافظة وعلى المستوى القومي تُقدر بنحو ١٥١ و ١١٧٢ ألف طن على الترتيب تمثل نحو ١٢,٧٧% فوق ذلك القدر من الإنتاج المحلي من القمح المحقق خلال الفترة (٢٠١٢-٢٠١٤)، كما أن تعميم استخدام هذه البرامج على محصول القمح بالمحافظة وعلى مستوى الجمهورية يحقق وفراً في المساحة المزروعة بهذا المحصول نتيجة تحقيق زيادة في الإنتاج المحلي ، وتُقدر المساحة التي تم توفيرها بنحو ٣٣٥ ألف فدان تمثل نحو ١٠,١١% (يُمكن زراعتها بمحاصيل شتوية أخرى كالفول البلدي والعدس) ، ويحقق ذلك وفراً في كمية مياه الري المستخدمة يقدر بنحو ٦٣٠ مليون متراً مكعباً. ومن ثَمَّ فإن تعميم استخدام هذه الحزمة على المحصول يحقق زيادة في نسبة الاكتفاء الذاتي من القمح من نحو ٥٤,٠٦% خلال الفترة(٢٠١٢-٢٠١٤) إلى نحو ٥٩,٥٣% ، وينعكس أثر تحقيق زيادة في الإنتاج المحلي من هذا المحصول الاستراتيجي على الميزان التجاري الزراعي بإحلال إنتاجه المحلي محل وارداته وبالتالي تخفيض قيمة وارداته من نحو ٢,٨٠ مليار دولار خلال الفترة (٢٠١٢-٢٠١٤) إلى نحو ١,٨٩ مليار دولار ، أي بنحو ٣٢,٦% ، ومن ناحيةٍ أخرى فإن استخدام هذه الحزمة يؤدي إلى زيادة صافي العائد الفداني منه وتحسين دخول الزراع بالمحافظة ورفع مستوى معيشتهم بنحو ٣٧١ مليون جنيه ، وكذا زيادة صافي الدخل الزراعي بالجمهورية بنحو ٢٨٧٧ مليون جنيه على المستوى القومي ، أي بنحو ١,٤٠%

وأوضحت النتائج أن أهم معوقات استخدام هذه الحزمة من وجهة نظر زراع العينة هي عدم توافر ماكينات المصاطب العريضة ، ارتفاع تكاليف الإنتاج ، وعدم توافر العمالة المدربة على تشغيل وصيانة هذه الماكينات ، لذا فإن الدراسة توصي بتعميم استخدام الحزمة التكنولوجية الموصى بها في حقول القمح بمحافظة الشرقية ، التعاون الوثيق بين البحثين وبين جهاز الإرشاد الزراعي لنشر هذه الحزمة التكنولوجية، توفير تقاوي الأصناف الجديدة عالية الإنتاجية من القمح في مواعيد مناسبة وبأسعار مناسبة، تفعيل دور محطات الخدمة الآلية والجمعيات التعاونية الزراعية من خلال تزويدها بماكينات المصاطب العريضة بأعداد كافية لتقديم خدماتها وفقاً لاحتياجات الزراع وبأسعار مناسبة لتشجيعهم على استخدامها ، وتدريب المرشدين الزراعيين على تشغيل وصيانة هذه الماكينات.