



## A Comparative Study of Egypt Crop Yields in New Lands and Old Lands

Howayda Y. Botros and Maha M. Bastawy

Agricultural Economics Research Institute - Agriculture Research Center, Ministry of Agriculture and Land Reclamation, Egypt

Email: [howayda.y@yahoo.com](mailto:howayda.y@yahoo.com)

**Abstract:** Egypt attempts to enhance its food production through the horizontal expansion of arable land to the sandy desert. The reclaimed land in the desert is referred to as new lands to differentiate it from the old farming land. The total cultivated area in the newly reclaimed land was about 3.1 million feddans as an annual average for the period 2017-2021. The largest effort of land reclamation took place in the Nubaria region with an estimated area of about one million feddan. The total value of farm production in year 2020 amounted to EGP 595.7 billion where the contribution of old lands was about 77.6 percent and the contribution of new lands was about 22.4 percent. Egypt is keen to increase its production of the wheat crop through the expansion of wheat acreage in the newly reclaimed lands. The contribution of the new lands to the national wheat acreage increased from about 11.3 percent in 1990-1999 to about 22.43 in 2010-2021. The average crop yield of the wheat crop per feddan was about 16 ardab for the old lands and 10 ardab for the new lands during the period 1990-1999. This average increased to 19 ardab for the old lands and 16 ardab for the new lands during the recent period of 2010-2021. The wheat yield gap between the old land and the new lands has been narrowing over the time period of 1990-2021. Furthermore, the incremental yield improvement for the white maize crop is higher for the new lands than its counterpart for the old lands. Another important export crop is potatoes. The acreage of potatoes has increased between the periods of 1990-1999 and 2000-2009 by 14 percent in the old lands and by 41 percent in the new lands. Finally, the potato crop yield has increased annually during the study period by statistically significant rates of about 0.11 tons in the old lands and 0.21 tons in the new lands. That is the incremental yield improvement for the potato crop in the new lands is almost twice its counterpart for the old lands.

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### Introduction:

In its pursuit for achieving food security Egypt attempts to enhance its food production through two main dimensions. The first one is known as horizontal expansion which means expanding the arable area in the Egyptian desert. The resultant reclaimed land is referred to as new lands to differentiate it from the old farming land. The second dimension to enhance food security is known as vertical expansion which means the increase of crop productivity per unit of land through the applications of modern farming practices and adoption of modern technologies. The total value of farm production in year 2020 amounted to EGP 595.7 billion where the contribution of old lands was estimated at 77.6 percent and the contribution of new lands was about 22.4 percent.

The total value of field crops production reached EGP 159.1 billion in 2020 with a small contribution of new lands amounting to 18.4 percent. However, the contribution of new lands to the total value of vegetable production was as high as 44.1

percent in year 2020. In fact the horticultural crops assume higher relative importance in the new lands compared to traditional field crops.

### Research Problem:

It is always assumed that new lands are less productive than the fertile old lands in Egypt. This claim might be true at the early stages of development of the reclaimed lands. But it is not known how the productivity gap between new lands and old lands is evolving over time. Previous studies tend to overlook the potential for improvements in crop productivity in the new lands. This study is an attempt to provide information on the development of yields of the main crops in both types of lands and how the yield gap is closing with the passage of time.

### Research Objectives:

The main objective of this research is to shed light on the evolution of crop yields in new lands and old lands over a long time period. The focus of the study is on five crops mainly; wheat, white maize, yellow maize, tomatoes and potatoes. The study

attempts to explain how the crop gap is widening or closing for different crops. Then the study concludes with a set of recommendations in order to enhance the land productivity in the new lands and hence to improve the food security potentialities in Egypt.

#### Research Methodology:

The study relied heavily on secondary data from the Ministry of Agriculture and Land Reclamation for the period 1990-2021. Descriptive statistics and time trend equations are utilized to explore the evolution of different crop yields. The similarities and disparities for different crops are highlighted in order to draw conclusions and policy recommendations for future development efforts.

#### Results and Discussion:

#### New Agricultural Lands:

Table 1 indicates the evolution of the national agricultural production in Egypt during the study period of 1990-2020. The annual average of the value of agricultural production during this period was EGP 203billion. The average contribution of the new lands to national agricultural production is estimated at 15 percent. However, this contribution has increased from about 5.5 percent in 1992 to about 22.4 percent in year 2020. According to the time trend equations in table 2, the value of agricultural production in the new lands has increased annually by about 0. 435 percent during the study period. This average annual rate of increase is highly significant from the statistical view point. However, the contribution of old lands has shown declining trend during the same period.

**Table (1):The Total value of Farm production in New and Old Lands .**

Year	The Total value of Farm production (EGP billion)	The value of Farm production in Old Land (EGP billion)	The value of Farm production in New Land (EGP billion)	%Old Lands	% New Lands
1990	-	-	-	-	-
1991	-	-	-	-	-
1992	30.96	29.27	1.70	94.52	5.48
1993	36.51	33.53	2.98	91.85	8.15
1994	-	-	-	-	-
1995	49.99	44.00	5.98	88.03	11.97
1996	56.08	48.76	7.32	86.94	13.06
1997	61.27	52.96	8.31	86.44	13.56
1998	63.64	54.21	9.43	85.19	14.81
1999	68.89	58.76	10.12	85.30	14.70
2000	71.66	61.40	10.27	85.68	14.32
2001	74.74	64.52	10.22	86.32	13.68
2002	84.26	72.90	11.36	86.52	13.48
2003	96.85	84.03	12.82	86.76	13.24
2004	111.84	96.87	14.96	86.62	13.38
2005	126.97	110.86	16.11	87.31	12.69
2006	137.40	119.00	18.40	86.61	13.39
2007	156.00	134.00	22.00	85.90	14.10
2008	186.00	159.00	27.00	85.48	14.52

2009	189.44	154.87	34.57	81.75	18.25
2010	209.30	172.10	37.20	82.23	17.77
2011	250.00	202.10	47.90	80.84	19.16
2012	267.40	215.30	52.10	80.52	19.48
2013	282.40	230.50	51.90	81.62	18.38
2014	305.40	247.50	57.90	81.04	18.96
2015	318.30	256.00	62.30	80.43	19.57
2016	356.90	287.80	69.10	80.64	19.36
2017	469.20	375.40	93.80	80.01	19.99
2018	500.40	403.90	96.50	80.72	19.28
2019	534.20	419.20	115.00	78.47	21.53
2020	595.70	462.30	133.40	77.61	22.39
Average	203.28	166.11	37.17	84.33	15.67

---- Not Available

**Source:** Ministry of Agriculture and Land Reclamation, Agricultural Economics Bulletins, The Economic Affairs Sector, Different Issues.

**Table (2): The Time Trend Equations for The contribution of New and Old Lands and The Cropped and Cultivated Areas of Old and New Lands.**

Y	The contribution to total Value of Agricultural Production (1990-2020)		Cropped Area (1990-2021)		Cultivated Area (1990-2021)	
	Old Lands	New Lands	Old Lands	New Lands	Old Lands	New Lands
<b>Intercept</b>	90.6423 (135.85)	9.3577 (14.025)	12,208,378 (117.61)	376,929 (3.42)	6,686,407 (99.44)	198,085 (2.28)
<b>Time</b>	-0.4351 ((10.82))	0.4351 (10.82)	(22,680) ((4.01))	153,125 (25.50)	(21,026) ((5.73))	107,986 (22.79)
<b>R<sup>2</sup></b>	0.82	0.82	0.36	0.96	0.53	0.95
<b>F statistic</b>	117.14 (0.000)	117.14 (0.000)	(0.00) 16.04	(0.00) 650.04	32.85 (0.00)	519.59 (0.00)

Numbers in parentheses are (t) values .

Y= The dependent variable

X= Time Variable

Table 3 shows that the total cultivated area in the newly reclaimed land was about 3.1 million feddans as an annual average for the period 2017-2021. The largest effort of land reclamation took place in the Nubaria region with an estimated area of about one million feddans. The Nubaria region is located in the middle between Cairo Governorate and Alexandria Governorate. It is also affiliated with Beheira

Governorate at the administrative level. About 823 thousand feddans were reclaimed in the governorates of Lower Egypt. The third largest region that witnessed land reclamation efforts was the New Valley governorate with a total area of about 424 thousand feddans. Matruh came in the fourth place with an average of about 416 thousand feddans.

**Table (3): Total Cultivated Area of New Lands in Egypt (Feddans),( 2017-2021).**

Governorates	2017	2018	2019	2020	2021	Average
Alexandria	103,837	96,319	79,734	67,450	73,579	84,184
Behairah	139,304	123,549	125,777	117,545	140,908	129,417
Gharbia	-	-	-	-	-	-
Kafr_El Sheikh	12,483	11,277	13,237	36,754	9,263	16,603
Dakahlia	63,698	60,498	60,166	61,420	59,713	61,099
Damietta	9,764	12,998	13,527	8,821	3,654	9,753
Sharkia	189,642	201,315	230,140	156,752	151,895	185,949
Ismailia	177,754	186,129	226,819	222,927	238,185	210,363
Port Said	83,564	84,266	88,103	49,188	60,102	73,045
Suez	26,304	26,594	25,545	26,969	26,612	26,405
Menoufia	33,268	1	-	-	-	16,635
Kalyoubia	195	198	-	-	-	197
Cairo	19,327	19,395	19,553	19,582	19,662	19,504
Lower Egypt	859,140	822,539	882,601	767,408	783,573	823,052
Giza	38,996	37,976	36,100	45,852	52,110	42,207
Beni Suef	45,751	45,566	44,528	42,862	41,678	44,077
Fayoum	19,061	17,798	22,976	26,175	21,201	21,442
Menia	55,095	72,204	69,754	75,465	71,103	68,724
Middle Egypt	158,903	173,544	173,358	190,354	186,092	176,450
Asyut	46,349	49,045	51,059	45,579	44,409	47,288
Suhag	45,551	39,478	40,058	40,361	45,094	42,108
Qena	44,404	58,793	60,042	54,492	57,964	55,139
Luxor	40,353	46,744	50,951	48,312	48,883	47,049
Aswan	127,140	109,885	118,048	158,808	214,304	145,637
Upper Egypt	303,797	303,945	320,158	347,552	410,654	337,221
Total	1,321,840	1,300,028	1,376,117	1,305,314	1,380,319	1,336,724
New Valley	361,451	402,396	437,510	408,705	512,304	424,473
Matruh	344,374	408,735	480,683	354,760	489,525	415,615
Red Sea	1,169	689	693	694	560	761
North Sinai	97,378	40,506	29,369	37,201	24,567	45,804
South Sinai	27,226	27,349	26,654	27,399	31,134	27,952
NoubArea	994,765	1,023,857	1,065,524	972,822	998,526	1,011,099
Out of Valley	1,826,363	1,903,532	2,040,433	1,801,581	2,056,616	1,925,705
G. Average	3,148,203	3,203,560	3,416,550	3,106,895	3,436,935	3,262,429

---- Not Available

**Source:** Ministry of Agriculture and Land Reclamation, Agricultural Economics Bulletins, The Economic Affairs Sector, Different Issues.

Table 4 shows the cropping intensity in old lands as well as in the new lands. The cropping intensity is calculated as the total cropped land divided by the total arable land. In other words it indicates the number of times each feddan is cultivated in a given

year. For example if the cropping intensity is 2 that mean that each feddan is cropped twice in a given year. As an average for the study period of 1990-2021 the cropping intensity was about 1.87 for the old land and

about 1.47 for the new lands. That means that the old lands are used more intensively than new lands.

**Table (4): Arable and Cropped Areas in New and Old Lands (1990-2021)**

Year	Arable Area		Cropped Area	
	Old Lands	New Lands	Old Lands	New Lands
1990	6,596,500	321,383	11,859,731	321,383
1991	6,626,845	396,356	12,009,594	396,356
1992	-	-	-	-
1993	6,531,782	646,906	11,835,168	944,800
1994	6,399,921	772,884	11,897,302	1,105,294
1995	6,973,564	839,179	12,601,502	1,212,959
1996	6,603,462	960,032	12,271,490	1,438,194
1997	6,713,788	1,012,139	12,322,166	1,506,864
1998	6,295,202	335,760	11,712,092	567,813
1999	6,279,864	557,852	11,707,486	2,231,049
<b>Average</b>	5,902,093	649,166	10,821,653	1,080,524
2000	6,237,956	1,594,754	11,698,459	2,223,407
2001	6,405,334	1,540,240	11,823,148	2,204,428
2002	6,486,922	1,661,118	11,953,962	2,396,312
2003	6,457,817	1,655,402	12,018,202	2,455,414
2004	6,623,286	1,655,368	12,145,099	2,406,131
2005	6,648,330	1,736,438	12,288,919	2,616,060
2006	6,656,160	1,754,826	12,280,391	2,640,070
2007	6,536,055	1,887,024	12,349,877	2,826,048
2008	6,454,076	1,978,110	12,229,128	3,007,849
2009	6,156,531	2,626,683	11,634,760	3,859,804
<b>Average</b>	6,466,247	1,808,996	12,042,195	2,663,552
2010	6,117,723	2,623,399	11,629,804	3,704,676
2011	6,071,219	2,548,208	11,648,550	3,704,958
2012	6,019,395	2,780,044	11,638,827	3,926,526
2013	6,182,507	2,771,816	11,661,557	3,828,566
2014	6,082,176	2,834,289	11,657,917	4,031,716
2015	6,155,756	2,939,949	11,602,804	4,034,289
2016	6,147,646	2,953,558	11,685,750	4,114,949
2017	5,985,065	3,148,203	11,716,474	4,321,719
2018	5,983,131	3,209,337	11,105,001	4,956,367
2019	5,916,256	3,416,550	11,149,097	5,066,069
2020	6,345,813	3,106,895	11,659,265	4,626,353
2021	6,159,545	3,436,935	11,416,673	4,958,353
<b>Average</b>	6,097,186	2,980,765	11,547,643	4,272,878
<b>G. Average</b>	6,349,988	1,925,859	11,845,490	2,826,928

---- Not Available

**Source:** Ministry of Agriculture and Land Reclamation, Agricultural Economics Bulletins, The Economic Affairs Sector, Different Issues.

Overall, however, cropping intensity is gaining larger momentum in the new lands compared with old land. Table 2 reveals that unlike the old lands the increase in cropping intensity in the new lands was statistically significant during the study period. The cropped area in the new lands has increased by a statistically annual average of about 153 thousand feddans during the period 1990-2021.

#### **The Wheat Crop:**

Table 5 shows that the annual average of the cultivated area of wheat was about 1.96 million feddans in the old lands and about 0.3 million feddans in the new lands during the period 1990-1999. These averages rose to 2.26 million feddans for the old lands and 0.46 million feddans for the new lands in the subsequent period of 2000-2009. During the recent

period of 2010-2021 the averages rose to 2.61 million feddans for the old lands and 0.62 million feddans for the new lands. Overall the wheat acreage during the study period of 1990-2021 was about 2.77 million

feddans on annual average basis. The contribution of the new lands to the national wheat acreage increased from about 11.3 percent in 1990-1999 to about 22.43 in 2010-2021.

**Table (5): Area and Yield of Wheat Crop,(1990-2021**

Year	Area (Fed)		Yield (Ardab/Fed)	
	Old Lands	New Lands	Old Lands	New Lands
1990	1,853,270	101,426	14.95	7.35
1991	2,063,753	151,317	13.77	9.67
1992	1,934,228	157,425	15.06	10.57
1993	1,829,212	342,118	16.23	7.42
1994	1,737,542	373,402	15.6	6.61
1995	2,100,057	411,757	16.42	8.88
1996	1,986,840	434,078	17.06	9.98
1997	2,084,971	401,160	16.63	10.8
1998	2,038,086	383,045	17.77	11.48
1999	1,999,571	379,879	18.77	12.57
<b>Average</b>	1,962,753	313,561	16	10
2000	2,030,826	432,439	18.64	13.66
2001	1,932,704	409,091	18.71	13.53
2002	2,001,238	449,190	18.82	14.47
2003	2,107,549	398,629	19.02	13.89
2004	2,182,066	423,417	19.16	14.28
2005	2,471,217	514,069	18.93	14.58
2006	2,537,537	526,164	18.64	14.94
2007	2,220,710	494,819	18.81	14.99
2008	2,448,393	471,911	18.70	15.66
2009	2,653,818	493,210	18.52	15.57
<b>Average</b>	2,258,606	461,294	19	15
2010	2,474,225	527,156	16.41	13.62
2011	2,498,317	550,284	18.78	16.26
2012	2,561,472	599,188	19.1	16.22
2013	2,750,089	627,787	19.19	16.39
2014	2,771,306	621,694	18.53	16.92
2015	2,749,915	718,949	19.09	16.09
2016	2,669,512	683,639	19	16.92
2017	2,374,705	547,010	19.6	17.54
2018	2,560,530	596,305	17.9	16.47
2019	2,531,769	603,178	18.5	16.95
2020	2,775,321	627,327	18.08	16.72
2021	2,653,683	765,744	19.73	17.32
<b>Average</b>	2,614,237	622,355	19	16
<b>G. Average</b>	2,299,514	475,525	18	14

Source: Ministry of Agriculture and Land Reclamation, Agricultural Economics Bulletins, The Economic Affairs Sector, Different Issues. Wheat ardab unit = 150 kg.

The average crop yield of the wheat crop per feddan was about 16 ardab for the old lands and 10 ardab for the new lands during the period 1990-1999. Table 5 shows that this average increased to 19 ardab for the old lands and 16 ardab for the new lands during

the recent period of 2010-2021. The yield gap between the old land and the new lands has been narrowing over the time period of 1990-2021. The time trend equations in table 6 reveal that the crop yield for wheat has been steadily growing at statistically significant

rates of 0.32 ardeb for the new lands and 0.11 ardeb for the old lands during the study period. In other words, the incremental increase of the wheat yield was almost three times its counterpart for the old lands during the study period.

#### White Maize Crop:

Table 7 indicates that the average acreage per annum of the white maize crop during the study period of 1990-2021 reached 1.52 million feddans for old lands and 0.11 million feddans for the new lands. If we break down the study period to three sub-periods we would

find out how the share of new lands progressed over time. The average acreage of white maize crop during the period 1990-1999 was 1.6 million feddans for the old lands and 0.06 million feddans for the new lands per annum. During the period 2000-2009 the average yearly acreage reached 1.5 million feddans for the old lands and 0.13 million feddans for the new lands. Finally, the average annual acreage reached about 1.52 million feddans for the old lands and about 0.11 million feddans for the new lands during the period 2010-2021.

**Table (6): The Time Trend Equations of Crop Yields (1990- 2021)**

Intercept	Wheat		Maize (White)		Maize (Yellow)		Tomatoes (All Seasons)		Potatoes (All Seasons)	
	Old Lands	New Lands	Old Lands	New Lands	Old Lands	New Lands	Old Lands	New Lands	Old Lands	New Lands
	16.0474 (40.87)	8.4900 (18.14)	20.9092 (31.91)	8.3057 (15.89)	20.7705 (33.54)	19.5034 (25.60)	12.9343 (28.98)	9.7686 (19.98)	8.6354 (44.43)	7.2307 (22.96)
Time	0.1148 (5.527)	0.3156 (12.75)	0.1340 (3.867)	0.3391 (12.27)	0.1125 (3.12)	0.1100 (2.480)	0.2076 (8.796)	0.2274 (8.796)	0.1065 (9.724)	0.2110 (11.90)
R <sup>2</sup>	0.50	0.84	0.33	0.83	0.27	0.19	0.72	0.72	0.77	0.83
F statistic	30.55 (0.000)	162.59 (0.000)	14.95 (0.000)	150.49 (0.000)	9.74 (0.0016)	6.15 (0.0197)	77.36 (0.000)	77.38 (0.000)	94.56 (0.000)	141.58 (0.000)

Numbers in parentheses are t values

**Table (7):: Area and Yield of White Maize Crop,(1990-2021)**

Year	Area (Fed)		Yield(Ardab/Fed)	
	Old Lands	New Lands	Old Lands	New Lands
1990	1,545,556	1,850	19	7
1991	1,675,262	968	19	10
1992	1,642,111	6,510	19	11
1993	1,593,684	67,506	19	7
1994	1,669,383	70,230	20	7
1995	1,671,274	80,105	19	9
1996	1,670,025	98,234	21	10
1997	1,520,537	115,477	23	11
1998	1,608,565	88,964	23	11
1999	1,471,363	89,594	24	13
Average	1,606,776	61,944	20.6	9.6
2000	1,532,266	90,780	24	14
2001	1,599,525	110,729	25	14
2002	1,414,618	137,249	25	14
2003	1,457,575	122,236	25	14
2004	1,437,011	134,136	25	14
2005	1,646,700	143,983	26	15
2006	1,460,340	106,138	26	15
2007	1,483,987	120,671	25	15
2008	1,482,500	160,869	25	16
2009	1,540,530	174,493	25	16
Average	1,505,505	130,128	25.10	14.70
2010	1,567,327	123,451	23	14
2011	1,365,514	116,699	24	16
2012	1,673,496	165,710	24	16

2013	1,587,299	136,651	24	16
2014	1,587,957	130,437	24	17
2015	1,615,268	125,511	23	16
2016	1,428,119	113,195	23	17
2017	1,338,085	119,469	24	18
2018	1,375,013	113,809	23	16
2019	1,248,004	117,451	23	17
2020	1,293,597	112,762	24	17
2021	1,319,870	110,867	23.84	21.85
<b>Average</b>	1,449,962	123,834	24	17
<b>G. Average</b>	1,516,324	106,460	23	14

**Source:** Ministry of Agriculture and Land Reclamation, Agricultural Economics Bulletins, The Economic Affairs Sector, Different Issues. Ardab unit of maize = 140 kg

The average annual yield per feddan for the white maize crop in the old lands progressed from 20.6 ardab for the period 1990-1999 to 25.1 for the period 2000-2009 and then to 24 ardab for the recent period of 2010-2021. A similar pattern is found for the crop yield in the new lands. The average annual crop yield was about 9.6 ardab for the period 1990-1999 and subsequently increased to 14.7 ardab for the period 2000-2009. The crop yield has increased during the period 2010-2021 where the annual average reached 17 ardab. Overall, the white maize crop yield increased over the study period 1990-2021 by statistically significant annual rates of 0.13 ardab for the old lands and 0.34 ardab for the new lands. Clearly, the incremental yield improvement for the white maize crop is higher for the new lands than its counterpart for the old lands.

### The Yellow Maize Crop:

Table 8 indicates that the average acreage per annum of the yellow maize crop during the study period of 1990-2021 reached about 245 thousand feddans for old lands and about 59 thousand feddans for the new lands. The average acreage of yellow maize crop during the period 1990-1999 was 35.6 thousand feddans for the old lands and 26.5 thousand feddans for the new lands per annum. During the period 2000-2009 the average yearly acreage reached 113 thousand feddans for the old lands and 24 thousand feddans for the new lands. Finally, the average annual acreage reached about 478 thousand feddans for the old lands and about 106 thousand feddans for the new lands during the period 2010-2021.

**Table(8): Area and Yield of Yellow Maize Crop,(1990-2021)**

Year	Area (Fed)		Yield(Ardab/Fed)	
	Old Lands	New Lands	Old Lands	New Lands
1990	-	-	-	-
1991	-	-	-	-
1992	-	-	-	-
1993	711	16,150	18	15
1994	11,317	34,658	19	22
1995	33,858	24,614	19	20
1996	59,515	33,641	20	19
1997	42,766	33,583	25	20
1998	33,813	23,859	23	20
1999	67,435	19,478	20	18
<b>Average</b>	35,631	26,569	20	19
2000	43,030	13,376	22	17
2001	56,386	6,812	25	23
2002	99,029	17,596	24	26
2003	71,230	6,719	22	23
2004	97,934	15,836	24	24
2005	127,479	22,099	24	21
2006	121,204	20,318	23	20
2007	143,731	33,455	23	21



<b>2008</b>	179,475	37,519	23	21
<b>2009</b>	195,507	67,041	24	21
<b>Average</b>	113,501	24,077	23	22
<b>2010</b>	246,364	61,106	21	22
<b>2011</b>	213,455	62,894	22	22
<b>2012</b>	260,149	57,721	23	20
<b>2013</b>	351,058	64,188	23	22
<b>2014</b>	392,466	74,672	24	23
<b>2015</b>	434,240	84,711	22	20
<b>2016</b>	531,235	142,107	23	22
<b>2017</b>	666,752	175,412	24	23
<b>2018</b>	732,287	114,516	23	21
<b>2019</b>	646,360	136,341	23	23
<b>2020</b>	594,237	151,881	24	22
<b>2021</b>	666,036	150,130	23.93	22.45
<b>Average</b>	477,887	106,307	23	22
<b>G. Average</b>	245,485	58,705	22	21

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Source: Ministry of Agriculture and Land Reclamation, Agricultural Economics Bulletins, The Economic Affairs Sector, Different Issues. Ardab unit of maize = 140 kg

The average annual yield per feddan for the yellow maize crop in the old lands progressed from 20 ardab for the period 1990-1999 to 23 for the period 2000-2009 and then has been fixed at 23 ardab for the recent period of 2010-2021. Similarly, the yellow maize crop yield in the new lands has increased over time. The average annual crop yield was about 19 ardab for the period 1990-1999 and subsequently increased to 22 ardab for the period 2000-2009. The crop yield in the new lands has been stable at an annual average of 22 ardab during the period 2010-2021. In general, the yellow maize crop yield increased over the study period 1990-2021 by statistically significant annual rates of 0.112 ardab for the old lands and 0.11 ardab for the new lands. The incremental yield improvement for the yellow maize crop in the old lands is almost equal to its counterpart for the new lands.

#### **The Tomatoes Crop:**

Table 9 outlines the evolution of the tomatoes crop in old lands and new lands. The average annual acreage of tomatoes during the period was about 264 thousand feddans in the old lands and about 168 thousand feddans in the new lands. For the period 1990-1999, the average acreage was about 298 thousand feddans in the old lands and about 53 thousand feddans in the new lands. Afterwards, the average acreage of the tomato crop during the period 2000-2009 jumped to about 333 thousand feddans in the old lands and 168 thousand feddans in the new lands. In other words, the acreage of tomatoes has increased between the periods of 1990-1999 and 2000-2009 by 11.8 percent in the old lands and 219 percent

in the new lands. That is the tomatoes acreage has more than doubled in a time span of ten years.

The tomato crop yield as an average for the study period 1990-2021 was about 16 tons per feddan for the old lands and 14 tons per feddan for the new lands. With regards to the first period of 1990-1999 the average tomato yield was about 14 tons for the old lands and 11 tons for the new lands. The crop yield of tomatoes showed some improvement in the second period of 2000-2009. As the table reveals the average yield increased to 17 tons for the old lands and 13 tons for the new lands. Finally, table 6 makes clear that the tomato crop yield has increased annually during the study period by statistically significant rates of 0.21 tons in the old lands and 0.23 tons in the new lands.

#### **The Potatoes Crop:**

Table 10 shows the evolution of the potatoes crop in old lands and new lands. The average annual acreage of potatoes during the period was about 249 thousand feddans in the old lands and about 57 thousand feddans in the new lands. For the period 1990-1999, the average potato acreage was about 187 thousand feddans in the old lands and about 22 thousand feddans in the new lands. Subsequently, the average acreage of the potato crop during the period 2000-2009 jumped to about 214 thousand feddans in the old lands and 31 thousand feddans in the new lands. In other words, the acreage of potatoes has increased between the periods of 1990-1999 and 2000-2009 by 14 percent in the old lands and by 41 percent in the new lands.

The potato crop yield as an average for the study period 1990-2021 was about 10 tons per feddan for the old lands and 11 tons per feddan for the new

lands. With regards to the first period of 1990-1999 the average potato yield was about 9 tons for the old lands and 8 tons for the new lands. The crop yield of potatoes showed slight improvement in the second period of 2000-2009. As the table reveals the average yield stayed at 11 tons for the old lands and increased to 12 tons for the new lands. Finally, table 6 reveals that the potato crop yield has increased annually during the study period by statistically significant rates of about 0.11 tons in the old lands and 0.21 tons in the new lands.

#### Recommendations:

The study reveals that agricultural production in the new lands is becoming important as its contribution is steadily increasing over time. The contribution of the new lands to the production of main crops like wheat and maize to the production of cereal

crops is improving over time. And the production of vegetables like potatoes and tomatoes in the new lands is vastly improving. The study reveals that the potato crop yield has increased annually during the study period by statistically significant rates of about 0.11 tons in the old lands and 0.21 tons in the new lands.

To further enhance crop production in the new lands the research and development institutions that serve desert farming should be strengthened. In addition modern inputs like seeds, chemical fertilizers, machinery, and modern irrigation technologies should become more readily available to farmers in the new lands. Of special importance is the need to develop the solar energy systems for farming operations in the new lands. Finally, additional attention should be devoted to the improvement of marketing and postharvest technology in the new lands.

**Table (9): Area and Yield of Tomato Crop (1990-2021)**

Year	Area (Fed)		Yield(Ton/Fed)	
	Old Lands	New Lands	Old Lands	New Lands
1990	370,525	452	11	10
1991	327,420	566	12	10
1992	341,698	20,177	13	8
1993	289,341	61,582	13	15
1994	119,055	27,428	12	10
1995	300,329	55,105	17	12
1996	324,485	77,691	15	12
1997	309,154	92,175	15	13
1998	316,917	45,572	15	10
1999	306,298	144,501	14	11
Average	297,534	52,525	14	11
2000	307,892	157,265	16	12
2001	281,783	148,424	16	12
2002	322,651	132,337	16	12
2003	324,645	134,638	17	12
2004	341,251	123,240	18	13
2005	361,020	134,361	18	13
2006	359,370	164,695	18	13
2007	378,347	158,861	17	13
2008	387,793	184,051	18	12
2009	262,041	337,574	18	17
Average	332,679	167,545	17	13
2010	231,470	283,732	17	16
2011	222,600	283,223	16	16
2012	242,851	272,374	17	16
2013	223,855	264,898	17	16
2014	197,425	312,137	17	16
2015	184,550	283,960	17	16
2016	176,143	264,090	18	16
2017	157,411	238,160	18	16
2018	148,817	240,212	20	16

<b>2019</b>	153,971	254,732	18	16
<b>2020</b>	139,411	240,600	19	16
<b>2021</b>	114,772	242,124	21	17
<b>Average</b>	182,773	265,020	18	16
<b>G. Average</b>	264,447	168,154	16	14

**Source:** Ministry of Agriculture and Land Reclamation, Agricultural Economics Bulletins, The Economic Affairs Sector, Different Issues.

**Table (10): Area and Yield of Potatoes Crop,(1990-2021)**

Year	Area (Fed)		Yield(Ton/Fed)	
	Old Lands	New Lands	Old Lands	New Lands
<b>1990</b>	-	-	-	-
<b>1991</b>	-	-	-	-
<b>1992</b>	184,626	7	9	5
<b>1993</b>	126,568	5,549	8	7
<b>1994</b>	147,376	6,797	9	8
<b>1995</b>	261,635	31,196	9	8
<b>1996</b>	266,654	42,674	8	9
<b>1997</b>	165,610	30,886	9	9
<b>1998</b>	179,715	31,746	9	9
<b>1999</b>	160,386	24,453	10	11
<b>Average</b>	186,571	21,664	9	8
<b>2000</b>	154,434	24,251	10	10
<b>2001</b>	169,264	20,500	10	10
<b>2002</b>	175,297	21,343	10	10
<b>2003</b>	170,621	26,630	10	10
<b>2004</b>	217,126	30,911	10	10
<b>2005</b>	270,556	30,106	10	11
<b>2006</b>	193,841	26,357	11	10
<b>2007</b>	226,569	30,464	11	10
<b>2008</b>	294,289	33,133	11	10
<b>2009</b>	267,100	62,621	11	11
<b>Average</b>	213,910	30,632	10	10
<b>2010</b>	278,656	55,987	11	11
<b>2011</b>	325,165	65,646	11	10
<b>2012</b>	349,718	72,158	11	11
<b>2013</b>	300,661	80,718	11	11
<b>2014</b>	328,564	80,971	11	12
<b>2015</b>	342,357	95,029	11	13
<b>2016</b>	287,611	89,020	10	12
<b>2017</b>	318,870	95,990	11	13
<b>2018</b>	308,264	99,812	12	13
<b>2019</b>	293,750	128,865	12	13
<b>2020</b>	392,960	167,858	11	14
<b>2021</b>	317,941	184,611	12	14
<b>Average</b>	320,376	101,389	11	12
<b>G. Average</b>	249,206	56,543	10	11

---- Not Available

**Source:** Ministry of Agriculture and Land Reclamation, Agricultural Economics Bulletins, the Economic Affairs Sector, Different Issues.

**References:**

- [1]. Samy, M.M. and H. S. A. El- Shatla (2007), The Role of Desert and New Lands in Putting Alternative Methods for The Wheat Problem in Egypt, *Agric. Sci. Mansoura Univ.*, 32 (10): 8589 - 8598.
- [2]. Hanne Kirstine Adriansen, (2009). Land reclamation in Egypt: A study of life in the new lands, *Geoforum*, Vol. 40, No.4 pp.664-674.
- [3]. Antanas Maziliauskas, Vytautas Morkunas, Zenonas RIMKUS), Valentinas Šaulys, (2007). Economic incentives in land reclamation sector in Lithuania, *Journal of Water and Land Development J. Water Land Dev.* No. 11: 17–30.
- [4]. Ahmed. Mahmoud. Emam and Khaled El Sayed Abd El-Mowla Mohamed,(2015), An Analytical Study Of The Banana Production In Old Lands Under Limiting Land And Irrigation Water Resource, *Egyptian Journal of Agricultural Economic*, Vol 25, No 1 .
- [5]. Sumanta Das, Malini Roy Choudhury, Subhasish Das and M. Nagarajan (2016), Earth Observation and Geospatial techniques for Soil Salinity and Land Capability Assessment over Sundarban Bay of Bengal Coast, India, *Geodesy And Cartography* Vol. 65, No 2, , pp. 163-192.
- [6]. G. Kovács (2018), Novel supply chain concepts and optimization of virtual enterprises to reduce cost, increase productivity and boost competitiveness, *Bulletin of The Polish Academy of Sciences Technical Sciences*, Vol. 66, No. 6.
- [7]. Véronique Alary, Adel Aboul-Naga , Mona A. Osman, Ibrahim Daoud, Sahar Abdelraheem , Ehab Salah, Xavier Juanes, Pascal Bonnet (2018), programs and family land dynamics in the Western Desert of the Nile Delta (Egypt), 1960–2010, *World Development* 104 140–153.
- [8]. Fredah Wangui Maina, John Mburu, Chris Ackello-Ogutu, Henrik Egelyng (2019) , Producers' valuation of geographical indications related attributes of agri-food products from semi-arid lands in Kenya, *Resources, Environment and Sustainability*, *Heliyon* 5 e01218 .
- [9]. Mohammed Sayaf Ebrahim Ali (2019) , *Journal of Agricultural Economics*, Vol. 29, No.4: (1853-1866).
- [10]. El-Tokhy, M. E. and Manal M. S. Khattab (2021), An Economic Study of the New Lands and the Current and Proposed Cropping Pattern and its Impact on Agricultural Development in Egypt, *Journal of Economics and Social Science*, Vol 12, No 6 ,June.
- [11]. Eman T. El roby and Mona Sh. El-s. Abdel Gawad (2021), Economics of the production and Marketing of Tomato Crops in the Old and New Lands of Fayoum Governorate, *Journal of Economics and Social Science* , Vol 11, No 1 .
- [12]. Salwa F. Elbeih (2021). Evaluation of agricultural expansion areas in the Egyptian deserts: A review using remote sensing and GIS q, *The Egyptian Journal of Remote Sensing and Space Sciences*, Pages 889 Volume 24 Issue 3, Part 2.
- [13]. Roman Rudnicki, Łukasz Wiśniewski (2021). Problem of water scarcity in agriculture – case study of land improvement in Kujawsko-Pomorskie Voivodship, *Journal of Water and Land Development.*, DOI: 10.24425/jwld..139010 -2021, No. 51 (X–XII): 17–24.
- [14]. Asal M. Wali, M. K. Kenawey, O. M. Ibrahim1 and E. M. Abd El Lateef,(2022) , Productivity of Quinoa (*Chenopodium quinoa* L).under new reclaimed soil conditions at north-western coast of Egypt *Bulletin of the National Research Centre* 46:38 .
- [15]. Elham Sh. Pargal, Engy A. Teimaa ,Yasmin M. Abu Al Yazid (2022), The impact of land reclamation on agricultural development in Egypt, *Egyptian Journal of Agricultural Economics*, Vol.32, No.4: 1255-1273.
- [16]. Hill, R.C, W.E. Griffiths and G. C. Lim (2011), *Principles of Econometrics*, Fourth Edition, John Wiley & Sons, Inc.
- [17]. Ministry of Agriculture and Land Reclamation, Central Administration of Agricultural Economics, *Bulletin of Agricultural Economics*, Different Issues. (2023).
- [18]. Adetomiwa Kolapo, Adekunle John Didunyemi, Oluwatoba John Aniyi, Oluwatosin Emmanuel Obembe (2023). Adoption of multiple sustainable land management practices and its effects on productivity of smallholder maize farmers in Nigeria, *Resources, Environment and Sustainability*, volume 11 in progress.

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