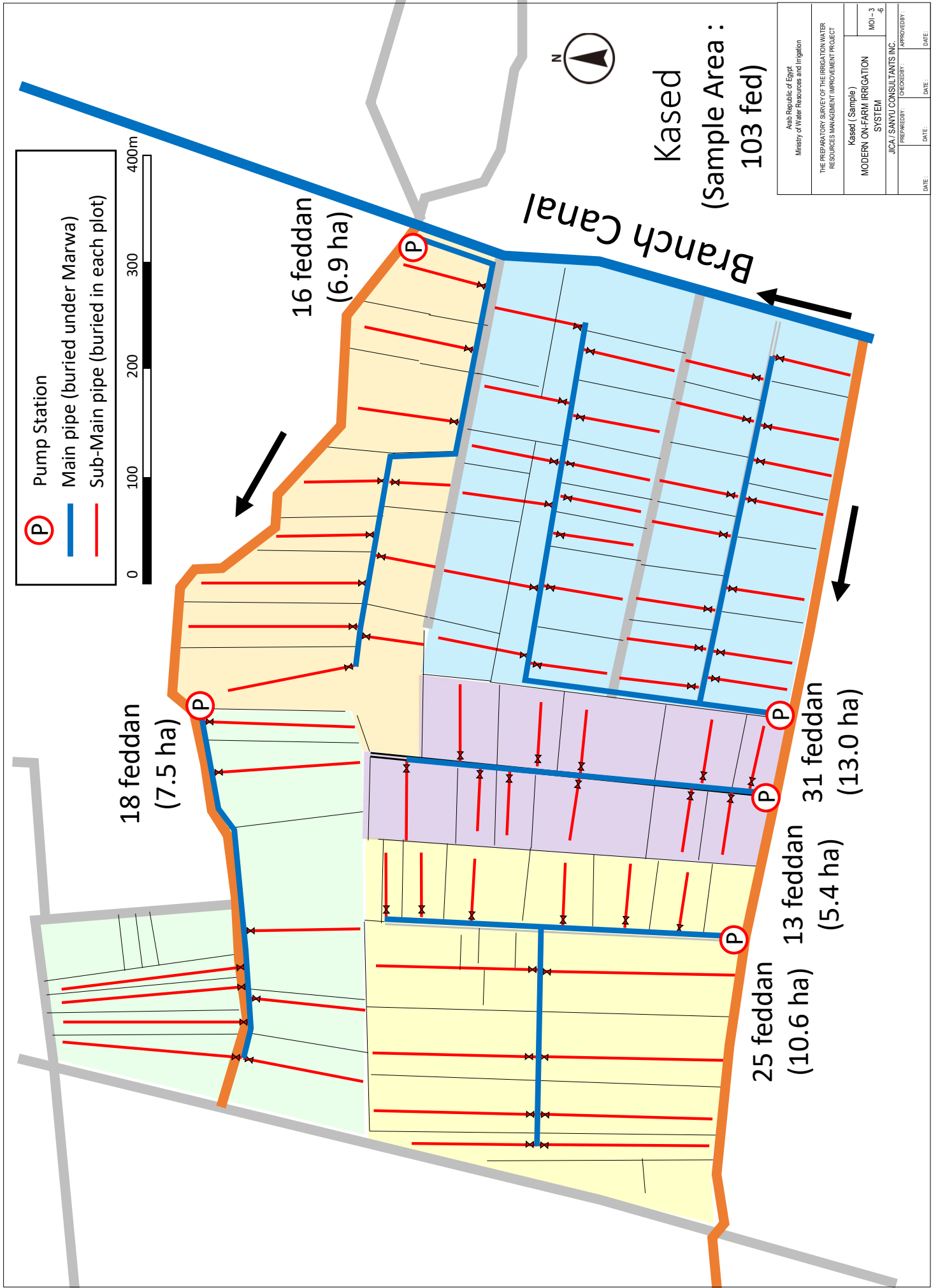
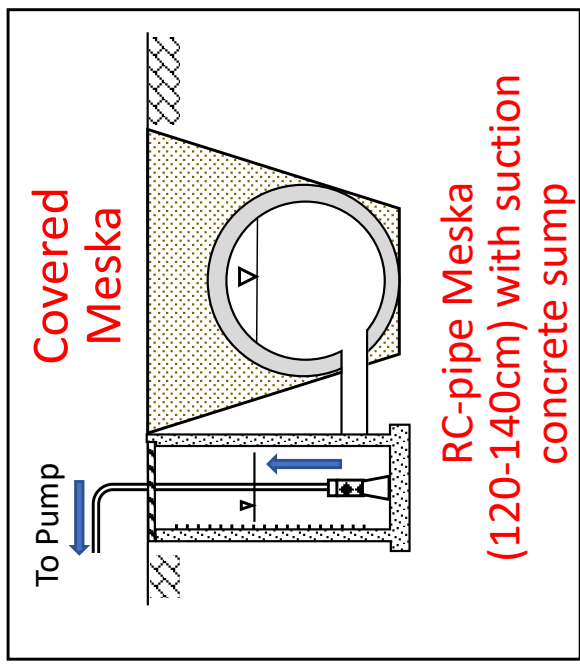
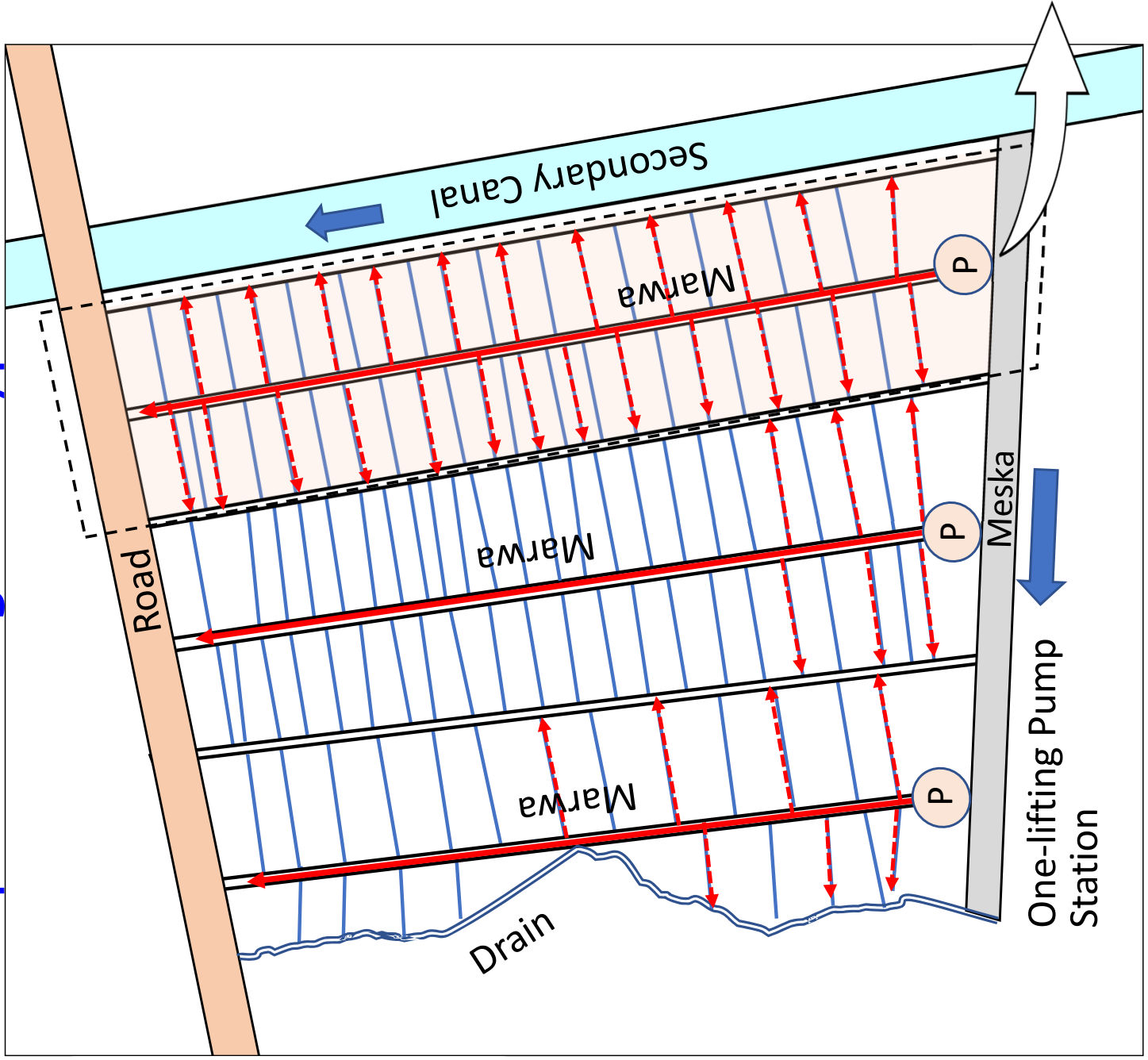


Arab Republic of Egypt Ministry of Water Resources and Irrigation	
THE PREPARATORY SURVEY OF THE IRRIGATION WATER RESOURCES MANAGEMENT IMPROVEMENT PROJECT	
Kased (Sample) SYSTEM	MOI-3 3
JICA / SAN'YU CONSULTANTS INC.	APPROVED BY:
PREPARED BY:	CHECKED BY:
DATE:	DATE:

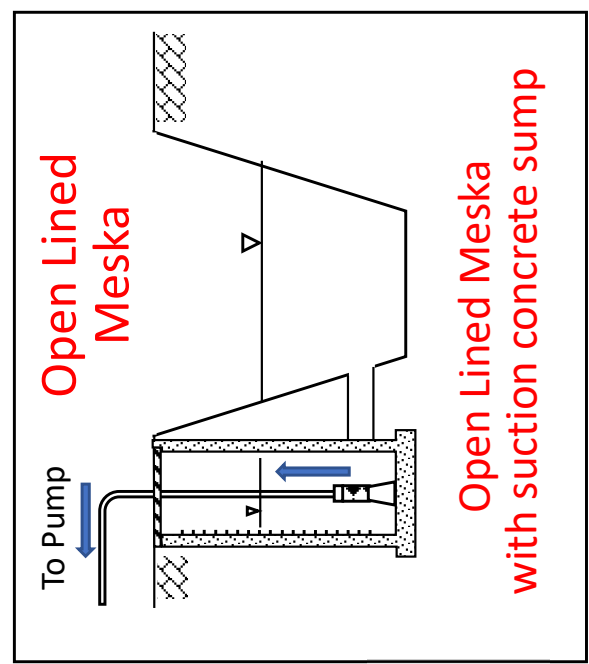


IV.2 Design Calculation for On-farm Irrigation System

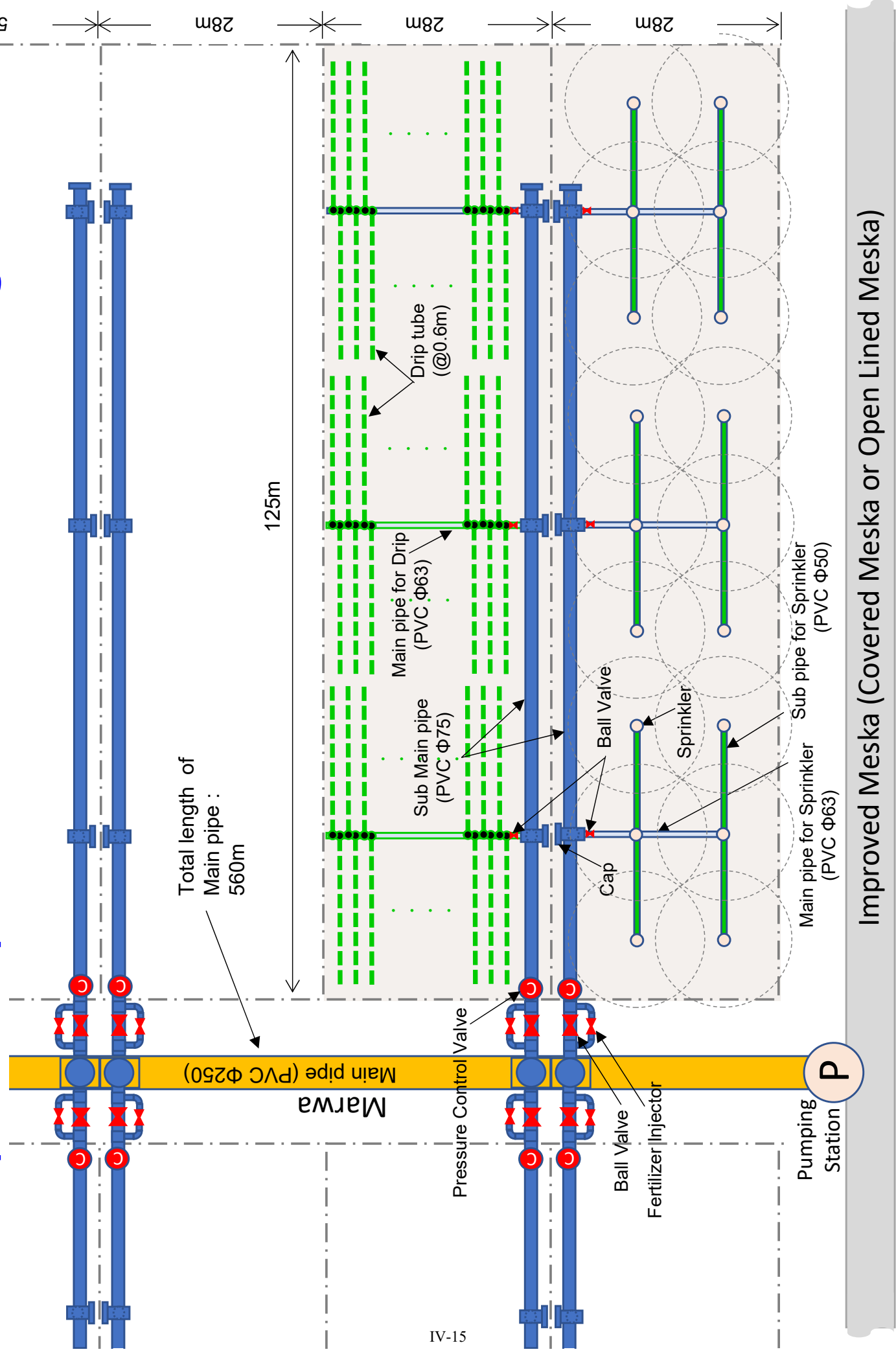
Conceptual Design for Typical Meska for Modern Irrigation by Modern Meska



or

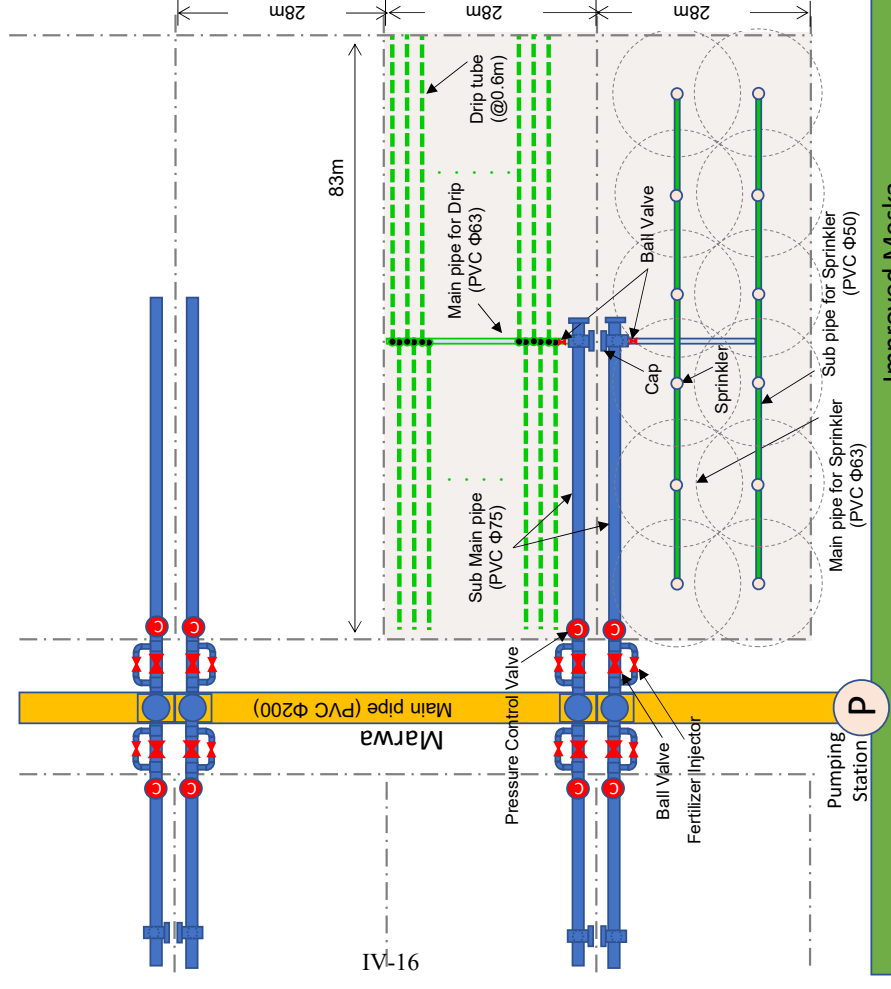


Proposed Layout of Modern On-farm Irrigation

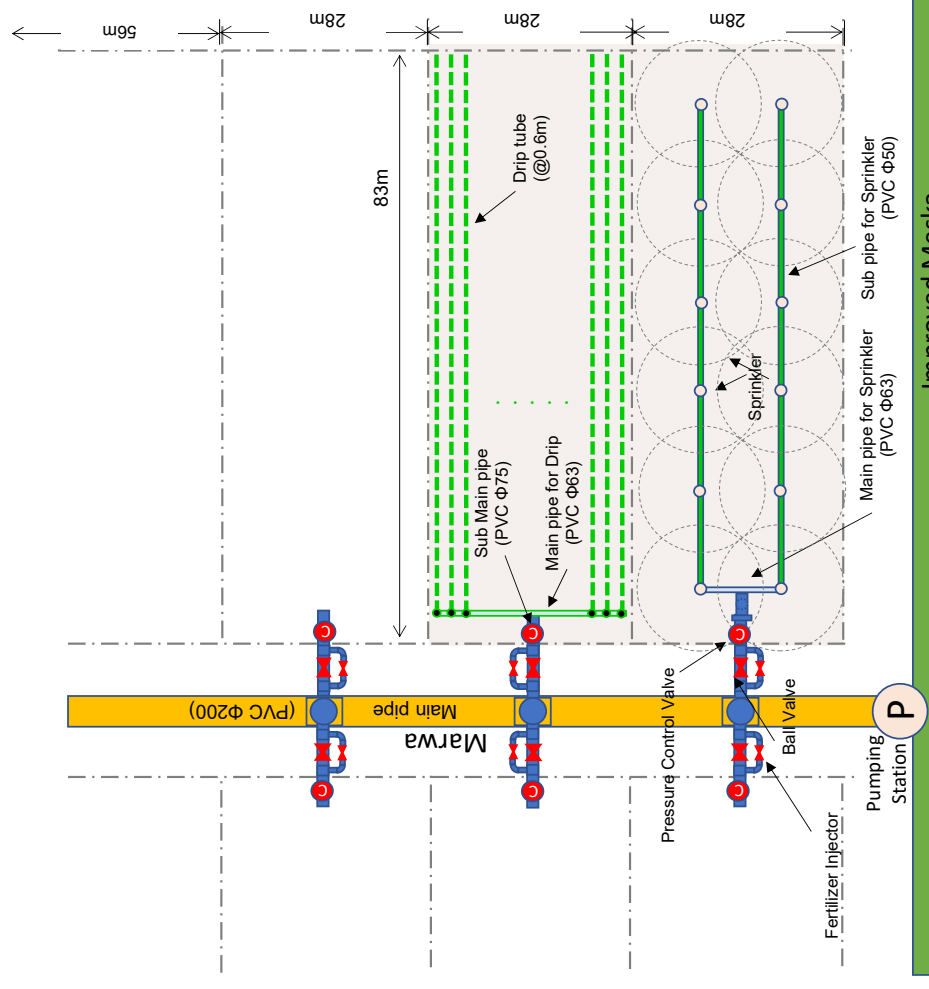


Layout : Main pipe buried under Marwa and sub-main pipe buried in each plot

Proposed Layout of Modern On-farm Irrigation (In case of 10 ~ 15 feddan)



Improved Meska



Improved Meska

Design Calculation

Prerequisite: Crop	Vegetable (Summer)	
Irrigation Days	30 days	
Field water requirement	752.0 m ³ /Fed.	
Field water requirement per Day	25.1 m ³ /Fed./day	6 mm/day
Irrigation Efficiency (Assumption)	80%	
Field gross water requirement per	31.4 m ³ /Fed./day	7.9 mm/day
Plot area covered by one Meska	100 Fed. 42 ha	42 ha
	420,000 m ²	
(Assumed) Field Length	750 m = Length of Meska	
(Assumed) Field Width	560 m = Length of Marwa Main pipe	
Field width covered by one Marwa	250 m (width on both sides centered on Marwa)	
Number of Marwa installations	3 Sites	
Irrigated area per Marwa	14 ha	
Irrigation Co/Intermittent Irrigation Days	5 Day	← Required water volume for intermittent irrigation days (5.4 days changed to 5.0 days)
Water requirement of the field	3,140 m ³ /day	2,188 l/min
Water requirement of the Meska		
Facility Size Plots Considering	15,700 m ³ /5day	← Water requirement 10,938 l/min
Intermittent Irrigation Days		
Irrigation hours per day	12 h	← Irrigation time changed from 8 hours to 12 hours
Design flow rate (Meska)	0.363 m ³ /s	
Design flow rate (divided by numl	0.121 m ³ /s	Design flow for entire area 4,380 Liter/min
		Design flow rate (divided by number of Marwa) 1,440 Liter/min
		← Taken over to pump specification (capacity per Marwa location)

A

B

A

For drip irrigation

【per area of field to be covered】

Field length	125 m
Field width	28 m
Target Area	3,500 m ²
	0.35 ha
	0.8 Fed.

Amount of irrigation to the field
(Sub Main line flow rate)

244.8 Liter/min
352.4 m³/day

Condition

Sub Main line length 104 m/piece
Required number of sub main line 1 piece
Diameter of Sub Main line 75 (mm)

Installation length of Main pipe to
Required number of Main pipe to
Diameter of Main pipe for Drip 28 m/piece
3 piece
50 (mm)

Installation length of drip tube
Drip tube spacing 20.8 m/piece
0.6 m
Required number of drip tubes 280 piece
Dripper spacing 0.5 m
Number of dripper locations 41 set/piece

Sub Main line per line

Required water requirement per S 352.4 m³/day
Required requirement per hour 14.7 m³/h
Required drip rate per drip tube 14.685 Liter/h
Number of drippers 11,480 set
Required water requirement per c 1.3 Liter/m/set

Drip Tube Selection Type: AMN-PC

Diameter	16 mm
Dripper spacing	0.5 m
Drip discharge	1.6 Liter/h

B

For sprinkler irrigation

【per area of field to be covered】

Field length (longitu	125 m
Field width (short si	28 m
Field Area	3,500 m ²
	0.35 ha
	0.8 Fed.

Amount of water irrigated to the
field (Sub Main line flow rate)

244.8 Liter/min
352.4 m³/day

Conditio Sub Main line installation Length
Required number of sub main line: 1 piece
Diameter of Sub Main line 75 (mm)

Installation length of Main pipe for
Required number of Main pipe for
Diameter of Main pipe for Sprinkle 21 m/piece
3 piece
50 (mm)

Length of sub pipe for Sprinkler
Required number of Sub pipe for S 280 m/piece
6 piece
30 (mm)

Sprinkler installation spacing
Number of sprinklers installed in long direction 2 set
Number of sprinklers installed in short side direction 9 set
Total number of sprinklers installed 18 set

Sub Main line per sprinkler

Sub Main line Water requirement f 352.4 m³/day
Water requirement per hour 14.7 m³/h
Water requirement per sprinkler 245 Liter/min
Water requirement per one sprinkl 13.6 Liter/min/set

Sprinkler selection type: 5022SD

Design pressure	0.25 Mpa = 2.5bar
Radius of sprinkler	10.5 m
Discharge of water sprayed	13.6 Liter/min

Sprinkler selection 5022SD

Pressure	0.25 Mpa = 2.5bar
Sprinkler radius	10.5 m
Sprinkler volume	13.6 Liter/min
Spacing	14 m

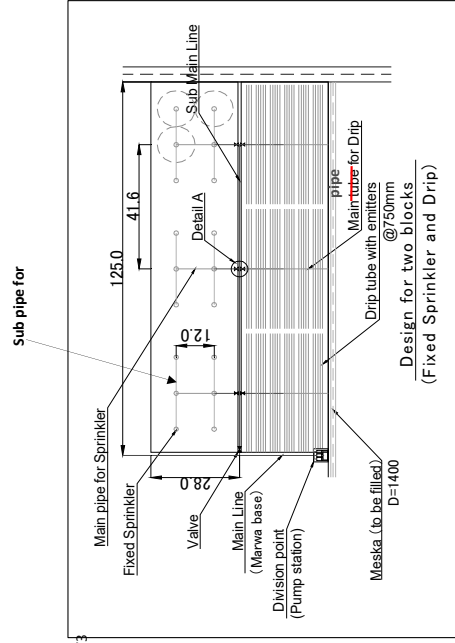
sprinkling radius x 2 12

Sprinkler intensity 4.163265 mm/hr
Facility capacity 1,440 Liter/min
Number of units that can be activated 105 set








Set the number of actuatable units 144 set Set the number of units to finish irrigating 14ha in 5 days of irrigation
New/Facility Capacity 1,958 Liter/min ← Taken over to pump specification (capacity per Marwa location)
1,958 m³/min

Irrigation block area per sprinkler 2.8 ha
6.7 Fed.
TRAM 37.5 mm

Irrigation time for sprinkler 11.3 hr → irrigation within 12 hours
Number of fields in sprinkler block 8 plot (~farmer)



ドリッパチューブの種類と仕様

シリーズ名	内径ドリッパ外観	口径 (mm)	肉厚 (mm)	適応圧力 (MPa)	滴下流量 (L/h)
AMN-PC 定流量型		16	0.90	0.10~0.30	1.1
			1.00	0.10~0.35	1.6
			1.15	0.10~0.35	2.2
AMN-PC-CNL ポタ菁石防止型		16	1.00	0.10~0.30	1.1
			1.15	0.10~0.30	1.6
AMN-PC-AS 破膜防止型		20	1.20	0.10~0.35	2.0
			1.20	0.10~0.35	3.8
TIF心流型		16	0.90	0.10~0.30	1.0
			1.00	0.10~0.35	1.15
			1.15	0.1~0.35	3.6
			1.15	0.1~0.35	4.0
TIF空室型		16	0.65	0.10~0.20	1.0
			0.90	0.10~0.30	2.0
			1.00	0.10~0.35	4.0
			1.15	0.10~0.35	4.0
ルーツガード 腐根等防止型		16	0.90	0.10~0.30	1.6
			1.10	0.10~0.40	2.9
P1		17	0.45	0.05~0.17	1.1
			0.60	0.05~0.2	1.5
			0.60	0.05~0.2	2.1
					3.8

適用ドリッパ内径 (cm)	20	30	40	50	60	70	100	150
AMN-PC定流量型	●	●	●	●	●	●	●	-
AMN-PC-CNLポタ菁石防止型	●	●	●	●	●	●	●	-
AMN-PC-AS破膜防止型	●	●	●	●	●	●	●	-
TIF定流量型	●	●	●	●	●	●	●	-
TIF空室型	●	●	●	●	●	●	●	-
ルーツガード腐根等防止型	-	●	●	●	●	●	●	●
P1	●	●	●	●	●	●	●	-

※ルーツガードは15cmドリッパも対応しています。25、33、75cmドリッパは数量により特注品となります。

樹脂製インバウスフラインクラー

5022SD-U

全径 12 m 13 L/min

樹形角 1/2"

※各機種の適用樹干径は表の通り、最大適用径を定めます。

※5022SD-U、5022SDは、スバチアサ (SD) を標準としたフラインクラーです。
・6号は、0.5MPa以下から適用できるタイプです。

径	5022SD	5022SD-U	5022SD	5022SD-U
12	2.20	2.20	2.20	2.20
13	2.20	2.20	2.20	2.20
14	2.20	2.20	2.20	2.20
15	2.20	2.20	2.20	2.20
16	2.20	2.20	2.20	2.20
17	2.20	2.20	2.20	2.20
18	2.20	2.20	2.20	2.20
19	2.20	2.20	2.20	2.20
20	2.20	2.20	2.20	2.20

5022SD

全径 13 m 20 L/min

樹形角 1/2"

※各機種の適用樹干径は表の通り、最大適用径を定めます。

※5022SDは、スバチアサ (SD) を標準としたフラインクラーです。
・7022SDは、0.5MPa以下から適用できるタイプです。

径	5022SD	5022SD-U	5022SD	5022SD-U
12	2.20	2.20	2.20	2.20
13	2.20	2.20	2.20	2.20
14	2.20	2.20	2.20	2.20
15	2.20	2.20	2.20	2.20
16	2.20	2.20	2.20	2.20
17	2.20	2.20	2.20	2.20
18	2.20	2.20	2.20	2.20
19	2.20	2.20	2.20	2.20
20	2.20	2.20	2.20	2.20

5022SD-U-PC

全径 12 m 12 L/min

樹形角 1/2"

※各機種の適用樹干径は表の通り、最大適用径を定めます。

※5022SD-U-PCは、スバチアサ (SD) を標準としたフラインクラーです。
・7022SD-U-PCは、0.5MPa以下から適用できるタイプです。

径	5022SD-U-PC	5022SD-U-PC	5022SD-U-PC	5022SD-U-PC
12	2.20	2.20	2.20	2.20
13	2.20	2.20	2.20	2.20
14	2.20	2.20	2.20	2.20
15	2.20	2.20	2.20	2.20
16	2.20	2.20	2.20	2.20
17	2.20	2.20	2.20	2.20
18	2.20	2.20	2.20	2.20
19	2.20	2.20	2.20	2.20
20	2.20	2.20	2.20	2.20

5024SD

全径 12 m 16 L/min

樹形角 1/2"

※各機種の適用樹干径は表の通り、最大適用径を定めます。

※5024SDは、スバチアサ (SD) を標準としたフラインクラーです。
・6号は、0.5MPa以下から適用できるタイプです。
・樹干径が、0.5MPa以下から適用できるタイプです。

径	5024SD	5024SD-U	5024SD	5024SD-U
12	2.20	2.20	2.20	2.20
13	2.20	2.20	2.20	2.20
14	2.20	2.20	2.20	2.20
15	2.20	2.20	2.20	2.20
16	2.20	2.20	2.20	2.20
17	2.20	2.20	2.20	2.20
18	2.20	2.20	2.20	2.20
19	2.20	2.20	2.20	2.20
20	2.20	2.20	2.20	2.20

※単位:径/ [mm]、1径 [m]、流量 [L/min]

(a) Design of pipe diameter for Meska

- Design Discharge ; $Q = 0.363 \text{ m}^3/\text{s}$
- Design WL ;

WL(Start) : LWL=	10.0	m	← Set as canal basement height
WL(End) : HWL=	9.5	m	← Currently almost natural flow (assumed height difference 2m), full water level of downstream 1.5m
WL(Start) : FWL=	12.0	m	← Full water level of upstream 2.0m
WL difference :	2.5	m =	0.0245 Mpa = 0.245 bar
- Water hammer;

Water distribution system pipelines
 If hydrostatic pressure is less than 0.35 MPa (3.5 bar), water hammer pressure shall be 100% of the hydrostatic pressure.
 $2.50 \times 100\% = 2.50 \text{ (m)}$

• Design water pressure; $= (2.50 + 2.50) / 101.9716 = 0.049 \text{ (MPa)} = 0.49 \text{ bar}$

- Pipe length ; $L = 750 \text{ m}$
- Hydraulic gradient ; $I = \{(10.000\text{m} - 9.500\text{m}) / 750\text{m}\} = 0.000606$
- Velocity coefficient ; $C = 130 \text{ (Concrete pipe)}$

The pipe diameter ; $D = 1.626 \times C^{-0.38} \times Q^{0.38} \times I^{-0.210}$ (Hazen-Williams)

$$D = 1.626 \times 130^{-0.38} \times 0.363 \times 0.38 \times 0.000606^{-0.210} = 0.82464558 \rightarrow 900 \text{ mm}$$

(b) Design of pipe diameter for Marwa (Main line)

- Design Discharge ; $Q = 0.033 \text{ m}^3/\text{s}$ ← per one Marwa

• Design flow velocity, $V=2.5\text{m/s}$ or less

Table: Average Flow Velocity of Pressurized Pipe

Diameter (mm)	Average velocity (m/s)	Discharge determined from average velocity (m ³ /s)
75 ~ 150	0.7 ~ 1.0	0.003 ~ 0.018
200 ~ 400	0.9 ~ 1.6	0.028 ~ 0.201
450 ~ 800	1.2 ~ 1.8	0.191 ~ 0.905
900 ~ 1500	1.3 ~ 2.0	0.827 ~ 3.534
1600 ~ 3000	1.4 ~ 2.5	2.815 ~ 17.671
200	1.039 (m/s)	0.033 (m ³ /s)

• Design WL ;

WL(start) : WL= 0 m ← Suction water level

WL(end) : WL= 50 m

← Currently gravity irrigation, sprinkler working pressure 50m secured at Marwa end

Actual Head 50 m

• Total Head ;

Actual Head+Friction loss head $\times (1+0.1)$ + loss around pump 2.5m

$$= 50.000 + 2.540 \times (1 + 0.1) + 2.5$$

= 55.29 (m)

Pipeline length; L= 560 m

Coefficient of flow 150 (PVC, HDPE)

Hydraulic head loss of frict $hf = 10.67 \times Q^{1.85} \times L / (C^{1.85} \times D^{4.87})$ (Hazen-Williams)

$$hf = 10.67 \times 0.033^{1.85} \times 560 / (150^{1.85} \times 0.200^{4.87})$$

$$= 2.540 \text{ m}$$

• Water hammer;

Pump system pipelines (pumping system)

If the hydrostatic pressure is 0.45 MPa (4.5 bar) or greater, the water hammer pressure shall be 60% of that value or 0.455 MPa (4.55 bar), whichever is greater.

50.00 \times 60%

$$= 30.00 \text{ (m)} =$$

$$0.294 \text{ (Mpa)}$$

$$< 0.455 \text{ (Mpa)}$$

$$0.455$$

$$2.94 \text{ (bar)}$$

$$4.55 \text{ (bar)}$$

• Design pressure;

$$= 55.29 / 101.9716 + 0.455$$

$$= 0.997 \text{ (MPa)} = 9.97 \text{ (bar)}$$

(c) Pipe diameter for Marwa Sub Main line (for sprinkler irrigation)

• Design discharge ; $Q = 0.004079 \text{ m}^3/\text{s}$ ← Flow rate of one Sub Main line diverted from Marwa

• Design flow velocity; $V = 2.5 \text{ m/s}$ or less

Table: Average Flow Velocity of Pressurized Pipe

Diameter (mm)	Average velocity (m/s)	Discharge determined from average velocity (m ³ /s)
75 ~	0.7 ~	1.0 ~ 0.018
200 ~	0.9 ~	1.6 ~ 0.201
450 ~	1.2 ~	1.8 ~ 0.905
900 ~	1.3 ~	2.0 ~ 3.534
1600 ~	1.4 ~	2.5 ~ 17.671
75	0.923 (m/s)	0.004 (m ³ /s)

• Design WL ;
 WL(start) : WL = 0 m ← Suction water level
 WL(end) : WL = 40 m ← Currently gravity irrigation, sprinkler working pressure 40m secured at Marwa end
 Actual Head 40 m

• Total Head ;
 Actual Head + Friction loss head $\times (1 + 0.1)$ + loss around pump 2.5m
 $= 40.000 + 1.197 \times (1 + 0.1) + 2.5$
 $= 43.82 \text{ (m)}$
 Pipeline length; L = 104.2 m
 Coefficient of flow 150 (PVC, HDPE)
 Hydraulic head loss of frict $hf = 10.67 \times Q^{1.85} \times L / (C^{1.85} \times D^{4.87})$ (Hazen-Williams)
 $hf = 10.67 \times 0.004^{1.85} \times 1.85 \times 104 / (150^{1.85} \times 0.075^{4.87})$
 $= 1.197 \text{ m}$

•Water hammer;

Pump system pipelines (pumping system)

If the hydrostatic pressure is greater than 0.45 MPa (4.5 bar), the water hammer pressure shall be 60% of that value or 0.455 MPa (4.55 bar), whichever is greater.
 $40.00 \times 60\%$

$$= 24.00 \text{ (m)} = 0.235 \text{ (Mpa)} < 0.455 \text{ (Mpa)} \quad 0.455$$

$$= 2.35 \text{ (bar)} \quad 4.55 \text{ (bar)}$$

•Design pressure;

$$= 43.82/101.9716 + 0.455$$

$$= 0.885 \text{ (MPa)} = 8.85 \text{ (bar)}$$

(d) Pipe diameter for Main pipe for Sprinkler

•Design discharge ; $Q = 0.001360 \text{ m}^3/\text{s}$ ← Flow rate of one main pipe for Sprinkler diverted from Marwa Sub Main line

•Design flow velocity; $V = 2.5 \text{ m/s}$ or less

Table: Average Flow Velocity of Pressurized Pipe

Diameter (mm)	Average velocity (m/s)	Discharge determined from average velocity (m ³ /s)
75 ~ 150	0.7 ~ 1.0	0.003 ~ 0.018
200 ~ 400	0.9 ~ 1.6	0.028 ~ 0.201
450 ~ 800	1.2 ~ 1.8	0.191 ~ 0.905
900 ~ 1500	1.3 ~ 2.0	0.827 ~ 3.534
1600 ~ 3000	1.4 ~ 2.5	2.815 ~ 17.671
50	0.692 (m/s)	0.001 (m ³ /s)

•Design WL ;

WL(start) : WL =

0 m

← Suction water level

WL(end)

30 m

← Currently gravity irrigation, sprinkler working pressure 30m secured at Marwa end

Actual head

30 m

• Total Head ;

$$\begin{aligned} &\text{Actual Head+Friction loss head} \times (1+0.1) \\ &= 30.000 + 0.228 \times (1+0.1) \\ &= 30.25 \quad (\text{m}) \end{aligned}$$

Pipeline length; L= 21.0 m

Coefficient of flow 150 (PVC, HDPE)

$$\begin{aligned} &\text{Hydraulic head loss of frict } hf = 10.67 \times Q^{1.85} \times L / (C^{1.85} \times D^{4.87}) \quad (\text{Hazen-Williams}) \\ &hf = 10.67 \times 0.001^{1.85} \times 21 / (150^{1.85} \times 0.050^{4.87}) \\ &= 0.228 \text{ m} \end{aligned}$$

• Water hammer;

Pump system pipelines (pumping system)

If hydrostatic pressure is less than 0.45 MPa (4.5 bar), water hammer pressure shall be 100% of the hydrostatic pressure.
 $30.00 \times 100\%$
 $= 30.00 \quad (\text{m})$

$$= (30.25 + 30.00) / 101.9716$$

• Design pressure; (MPa) = 5.91 (bar)

(e) Diameter of Marwa Sub Main line (for drip irrigation)

• Design discharge ; Q= 0.00408 m³/s

← Flow rate of one Sub Main line diverted from Marwa

• Design flow velocity; V=2.5m/s or less

Table: Average Flow Velocity of Pressurized Pipe

Diameter (mm)	Average velocity (m/s)	Discharge determined from average velocity (m ³ /s)
75 ~ 150	0.7 ~ 1.0	0.003 ~ 0.018
200 ~ 400	0.9 ~ 1.6	0.028 ~ 0.201
450 ~ 800	1.2 ~ 1.8	0.191 ~ 0.905
900 ~ 1500	1.3 ~ 2.0	0.827 ~ 3.534

1600 ~	3000	1.4 ~	2.5	2.815 ~	17.671
75		0.923 (m/s)		0.004 (m ³ /s)	

• Design WL ; WL(start) : WL= 0 m ← Suction water level
 WL(end) 30 m ← Currently gravity irrigation, sprinkler working pressure 30m secured at Marwa end
 Actual head 30 m

• Total Head ; Actual Head+Friction loss head x(1+0.1)+loss around pump 2.5m
 = 30.000+1.197 x(1+0.1)+2.5
 = 33.82 (m)
 Pipeline length; L= 104.2 m
 Coefficient of flow 150 (PVC, HDPE)
 Hydraulic head loss of frict $hf = 10.67 \times Q^{1.85} \times L / (C^{1.85} \times D^{4.87})$ (Hazen-Williams)
 $hf = 10.67 \times 0.004^{1.85} \times 1.85 \times 104 / (150^{1.85} \times 0.075^{4.87})$
 = 1.197 m

• Water hammer; Pump system pipelines (pumping system)
 If hydrostatic pressure is less than 0.45 MPa (4.5 bar), water hammer pressure shall be 100% of the hydrostatic pressure.
 $30.00 \times 100\%$
 = 30.00 (m)

• Design pressure; = (33.82+30.00)/101.9716
 = 0.626 (MPa) = 6.26 (bar)

(f) Diameter for Main pipe for Drip

• Design Discharge ; Q= 0.00136 m³/s ← Flow rate of one main pipe for Drip diverted from Marwa Sub Main line

• Design flow velocity; V=2.5m/s or less

Table: Average Flow Velocity of Pressurized Pipe

Diameter (mm)	Average velocity (m/s)	Discharge determined from average velocity (m ³ /s)
75 ~ 150	0.7 ~ 1.0	0.003 ~ 0.018
200 ~ 400	0.9 ~ 1.6	0.028 ~ 0.201
450 ~ 800	1.2 ~ 1.8	0.191 ~ 0.905
900 ~ 1500	1.3 ~ 2.0	0.827 ~ 3.534
1600 ~ 3000	1.4 ~ 2.5	2.815 ~ 17.671
50	0.692 (m/s)	0.001 (m ³ /s)

• Design WL : WL= 0 m ← Suction water level
 WL(end) 30 m ← Main pipe for Dripr end to ensure drip tube applied pressure 30m
 Actual head 30 m

• Total Head :
 Actual Head + Friction loss head $\times (1 + 0.1)$
 $= 30.000 + 0.304 \times (1 + 0.1)$
 $= 30.33$ (m)
 Pipeline length; L = 28.0 m
 Coefficient of flow 150 (PVC, HDPE)
 Hydraulic head loss of frict $hf = 10.67 \times Q^{1.85} \times L / (C^{1.85} \times D^{4.87})$ (Hazen-Williams)
 $hf = 10.67 \times 0.001^{1.85} \times 28 / (150^{1.85} \times 0.050^{4.87})$
 $= 0.304$ m

• Water hammer;
 Pump system pipelines (pumping system)
 If hydrostatic pressure is less than 0.45 MPa (4.5 bar), water hammer pressure shall be 100% of the hydrostatic pressure.
 $30.00 \times 100\%$
 $= 30.00$ (m)

• Design pressure;
 $= (30.33 + 30.00) / 101.9716$
 $= 0.592$ (MPa) = 5.92 (bar)

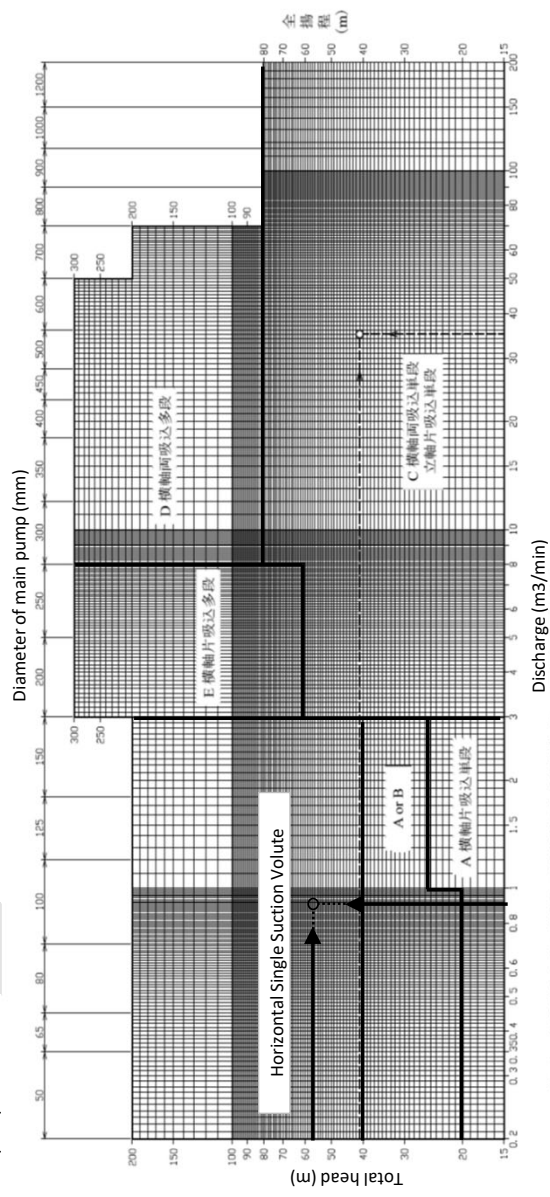
(c) Design of Pump Specification

1. Selection of main pump

Design discharge 1.958m³/min, Design total head 56m

Main pump type Horizontal Single Suction Volute Pump

Main pump diameter : 150mm



V. COST ESTIMATION

Undisclosed Information

VI. PROJECT EVALUATION

Table 1 List of Financial and Economic Unit Prices

Item	Unit	Unit Price (EGP)			Conversion Factor		Remark
		Financial	Economic (Delta)	Economic (U. Egypt)	Delta	U. Egypt	
Maize	ton	8,000	7,239	7,555	0.905	0.944	Border price
Wheat	ton	6,667	9,174	9,491	1.376	1.424	Border price
Rice (Paddy)	ton	9,000	5,083	-	0.565	-	Border price
Sugarbeet	ton	750	1,024	1,065	1.365	1.420	Border price
Sorghum	ton	8,000	-	7,832	-	0.979	SCF
Berseem	ton	1,000	979	979	0.979	0.979	SCF
Onion	ton	3,000	2,937	2,937	0.979	0.979	SCF
Tomatoes	ton	2,500	2,448	2,448	0.979	0.979	SCF
Wheat By-product	Hay	600	587	587	0.979	0.979	SCF
Rice By-product	20kg	3	3	-	1.000	-	SCF
Fertilizers							
Urea	ton	9,000	8,854	8,537	0.984	0.949	Border price
TSP	ton	7,200	9,555	9,239	1.327	1.283	Border price
Pesticide							
Insecticide	liter	150	147	147	0.979	0.979	SCF
Fungicides	liter	150	147	147	0.979	0.979	SCF
Herbicides	liter	100	98	98	0.979	0.979	SCF
Labor	Day	140	140	140	1.000	1.000	
Machinery							
Tractor rent (grain)	hour	300	294	294	0.980	0.980	SCF
Pumping (electricity)	hour	150	147	147	0.980	0.980	SCF
Harvesting	hour	350	343	343	0.980	0.980	SCF
Threshing	hour	250	245	245	0.980	0.980	SCF
Seeds/ Seedling							
Rice	bag (25kg)	440	431	431	0.979	0.979	SCF
Wheat	kg	15	15	15	0.979	0.979	SCF
Maize	kg	50	49	49	0.979	0.979	SCF
Sorghum	kg	700	685	685	0.979	0.979	SCF
Sugarbeet	kg	500	490	490	0.979	0.979	SCF
Onion	kg	50	49	49	0.979	0.979	SCF
Tomatoes (seedling)	Tray	250	245	245	0.979	0.979	SCF
Berseem	kg	150	147	147	0.979	0.979	SCF

Source: JICA Survey team collected through farm economy surveys and calculated from the international market prices

Table 2 Standard Conversion Factor (SCF)

Unit Million EGP

Item	2015	2016	2017	2018	2019	Ave.
1. Total Import (CIF)	708,289.1	1,187,063.1	1,464,815.7	1,319,132.4	1,102,238.0	1,156,307.7
2. Total Export (FOB)	230,318.7	469,997.8	523,833.8	513,725.8	472,305.4	442,036.3
3. Customs and import duties	27,534.0	33,410.9	36,848.1	40,994.9	31,644.4	34,086.5
4. Taxes on exports	215.7	257.8	428.8	426.8	353.9	336.6
5. Export Subsidy	-	-	-	-	-	-
6 = 1 + 2	938,607.8	1,657,060.9	1,988,649.5	1,832,858.2	1,574,543.4	1,598,344.0
7 = 1 + 2 + 3 - 4 + 5	965,926.1	1,690,214.0	2,025,068.8	1,873,426.3	1,605,833.9	1,632,093.8
8. SCF = 6/7	0.972	0.980	0.982	0.978	0.981	0.979

Source: Import and Export: Statistical Year Book 2021

Customs and import duties and Taxes on Export: OECD

[Details of Public Revenues - Egypt \(oecd.org\)](https://data.oecd.org/public-revenues-egypt/)

Table 3 Economic Farmgate Price Calculation: Crop: Rice (Export) (Delta)

Item	Unit	Economic Price	
		US\$/t	EGP/t
World Bank Commodities Price Forecast (Ave. 2020-2022 Price: FOB)	US\$/t		463
(Thai 5% broken FOB Bangkok in ave. 2020-2022)	US\$/t		
Ocean Freight and Insurance	US\$/t		
Cost FOB Alexandria Port	US\$/t		463
Converted to EGP (USD1 = EGP24.38)	EGP/t	11,288	
Handling cost (65LE/ton)(*)	EGP/t		64
Storage fee (1% of FOB)	EGP/t		113
Port fee (50% of storage fee and handling fee)	EGP/t		89
Price at Alexandria Port	EGP/t	11,023	
Transport from Port to Delta	EGP/t		255
Trader's margin (10% of price at Alexandria)	EGP/t		1,102
Ex-milling Price at Delta	EGP/t		9,666
Milling Cost (13LE/70kg)	EGP/t		210
Price at Milled Rice	EGP/t		9,456
Equivalent to Price of Paddy (65% milling rate)	EGP/t		6,146
Transport from Farm to Delta	EGP/t		117
Trader's margin (10% of price at Delta)	EGP/t		946
Economic Farmgate Price	EGP/t		5,083
Financial Farmgate Price (8,500 - 9,000)	EGP/t		9,000
Conversion Factor	EGP/t		0.565

Referred: World Bank Commodities Market, IFAD STAR
Transportation cost (field survey by the JICA Team).

Table 4 Economic Farmgate Price Calculation: Crop: Wheat (Import) (Delta)

Item	Unit	Economic Price	
		US\$/t	EGP/t
World Bank Commodities Price Forecast (Ave. 2020-2022 Price: FOB)	US\$/t		326
Ocean Freight and Insurance	US\$/t		40
Cost CIF Alexandria Port	US\$/t		366
Converted to EGP (USD1 = EGP24.38)	EGP/t		8,923
Handling cost (65LE/ton)(*)	EGP/t		64
Storage fee (1% of CIF)	EGP/t		89
Port fee (50% of storage fee and handling fee)	EGP/t		77
Price at Alexandria Port	EGP/t		9,153
Transport from Port to Delta	EGP/t		255
Trader's margin (10% of price at Alexandria)	EGP/t		915
Price at Delta	EGP/t		10,323
Transport from Farm to Delta	EGP/t		117
Trader's margin (10% of price at Delta)	EGP/t		1,032
Economic Farmgate Price	EGP/t		9,174
Financial Farmgate Price	EGP/t		6,667
Conversion Factor	EGP/t		1.376

Government buys wheat for the 2022/23 winter season: EGP1000/ardab (150kg)

Table 5 Economic Farmgate Price Calculation: Crop: Maize (Import) (Delta)

Item	Unit	Economic Price	
		US\$/t	EGP/t
World Bank Commodities Price Forecast (Ave. 2020-2022 Price: FOB)	US\$/t		247
Ocean Freight and Insurance	US\$/t		40
Cost CIF Alexandria Port	US\$/t		287
Converted to EGP (USD1 = EGP24.38)	EGP/t		6,997
Handling cost (65LE/ton)(*)	EGP/t		64
Storage fee (1% of CIF)	EGP/t		70
Port fee (50% of storage fee and handling fee)	EGP/t		67
Price at Alexandria Port	EGP/t		7,198
Transport from Port to Delta / Beni Suef / Fayoum	EGP/t		255
Trader's margin (10% of price at Alexandria)	EGP/t		720
Price at Delta	EGP/t		8,173
Transport from Farm to Delta	EGP/t		117
Trader's margin (10% of price at Delta)	EGP/t		817
Economic Farmgate Price	EGP/t		7,239
Financial Farmgate Price (white) (Yellow 10,000)	EGP/t		8,000
Conversion Factor	EGP/t		0.905

Table 6 Economic Farmgate Price Calculation: Crop: Sugar beet (Import) (Delta)

Item	Unit	Economic Price	
		US\$/t	EGP/t
World Bank Commodities Price Forecast (Ave. 2020-2022 Price: FOB) for Sugar	US\$/t		360
Ocean Freight and Insurance	US\$/t		40
Cost CIF Alexandria Port	US\$/t		400
Converted to EGP (USD1 = EGP24.38)	EGP/t		9,752
Handling cost (65LE/ton)(*)	EGP/t		64
Storage fee (1% of CIF)	EGP/t		98
Port fee (50% of storage fee and handling fee)	EGP/t		81
Price at Alexandria Port	EGP/t		9,995
Transport from Port to Delta	EGP/t		255
Trader's margin (10% of price at Alexandria)	EGP/t		1,000
Price at Delta	EGP/t		11,250
Processing Cost	EGP/t		1,500
Price at Sugar Factory	EGP/t		9,750
Price of Sugarbeet (13% of total weight)	EGP/t		1,268
Transport from Farm to Delta	EGP/t		117
Trader's margin (10% of price at Delta)	EGP/t		127
Economic Farmgate Price	EGP/t		1,024
Financial Farmgate Price	EGP/t		750
Conversion Factor	EGP/t		1.365

Table 7 Economic Farmgate Price Calculation: Fertilizers (Export) (Delta)

Item	Unit	Economic Price	
		Urea (N)	TSP (P205)
World Bank Commodities Price Forecast (Ave. 2020-2022 Price: FOB)	US\$/t	477	513
Ocean Freight and Insurance	US\$/t		
Cost FOB Alexandria Port	US\$/t	477	513
Converted to EGP (USD1 = EGP24.38)	EGP/t	11,629	12,507
Handling cost (65LE/ton)(*)	EGP/t		64
Storage fee (1% of CIF)	EGP/t		125
Port fee (50% of storage fee and handling fee)	EGP/t		95
Price at Alexandria Port	EGP/t	11,359	12,224
Transport from Port to Delta	EGP/t		255
Distributor's margin (10% of price at Alexandria)	EGP/t		1,222
Price at Delta	EGP/t		10,747
Transport from Farm to Delta	EGP/t		117
Local Distributor's margin (10% of price at Delta)	EGP/t		1,075
Economic Farmgate Price	EGP/t		8,554
Financial Farmgate Price	EGP/t		7,200
Conversion Factor	EGP/t		0.984

Ocean Freight Insurance Twill (shipping company)

Table 8 Economic Farmgate Price Calculation: Crop: Wheat (Import) (Upper Egypt)

Item	Unit	Economic Price	
		US\$/t	EGP/t
World Bank Commodities Price Forecast (Ave. 2020-2022 Price: FOB)	US\$/t		326
Ocean Freight and Insurance	US\$/t		40
Cost CIF Alexandria Port	US\$/t		366
Converted to EGP (USD1 = EGP24.38)	EGP/t		8,923
Handling cost (65LE/ton)(*)	EGP/t		64
Storage fee (1% of CIF)	EGP/t		89
Port fee (50% of storage fee and handling fee)	EGP/t		77
Price at Alexandria Port	EGP/t		9,153
Transport from Port to Upper Egypt (Beni Suef / Fayoum)	EGP/t		607
Trader's margin (10% of price at Alexandria)	EGP/t		915
Price at Upper Egypt	EGP/t		10,675
Transport from Farm to Upper Egypt (Beni Suef / Fayoum)	EGP/t		117
Trader's margin (10% of price at Upper Egypt)	EGP/t		1,087
Economic Farmgate Price	EGP/t		9,491
Financial Farmgate Price	EGP/t		6,667
Conversion Factor	EGP/t		1.424

Government buys wheat for the 2022/23 winter season: EGP1000/ardab (150kg)

Table 9 Economic Farmgate Price Calculation: Crop: Maize (Import) (Upper Egypt)

Item	Unit	Economic Price	
		US\$/t	EGP/t
World Bank Commodities Price Forecast (Ave. 2020-2022 Price: FOB)	US\$/t		247
Ocean Freight and Insurance	US\$/t		40
Cost CIF Alexandria Port	US\$/t		287
Converted to EGP (USD1 = EGP24.38)	EGP/t		6,997
Handling cost (65LE/ton)(*)	EGP/t		64
Storage fee (1% of CIF)	EGP/t		70
Port fee (50% of storage fee and handling fee)	EGP/t		67
Price at Alexandria Port	EGP/t		7,198
Transport from Port to Upper Egypt (Beni Suef / Fayoum)	EGP/t		607
Trader's margin (10% of price at Alexandria)	EGP/t		720
Price at Upper Egypt	EGP/t		8,525
Transport from Farm to Upper Egypt (Beni Suef / Fayoum)	EGP/t		117
Trader's margin (10% of price at Upper Egypt)	EGP/t		853
Economic Farmgate Price	EGP/t		7,555
Financial Farmgate Price (white) (Yellow 10,000)	EGP/t		8,000
Conversion Factor	EGP/t		0.944

Table 10 Economic Farmgate Price Calculation: Crop: Sugar beet (Import) (Upper Egypt)

Item	Unit	Economic Price	
		US\$/t	EGP/t
World Bank Commodities Price Forecast (Ave. 2020-2022 Price: FOB) for Sugar	US\$/t		360
Ocean Freight and Insurance	US\$/t		40
Cost CIF Alexandria Port	US\$/t		400
Converted to EGP (USD1 = EGP24.38)	EGP/t		9,752
Handling cost (65LE/ton)(*)	EGP/t		64
Storage fee (1% of CIF)	EGP/t		98
Port fee (50% of storage fee and handling fee)	EGP/t		81
Price at Alexandria Port	EGP/t		9,995
Transport from Port to Upper Egypt (Beni Suef / Fayoum)	EGP/t		607
Trader's margin (10% of price at Alexandria)	EGP/t		1,000
Price at Upper Egypt	EGP/t		11,602
Processing Cost	EGP/t		1,500
Price at Sugar Factory	EGP/t		10,102
Price of Sugarbeet (13% of total weight)	EGP/t		1,313
Transport from Farm to Upper Egypt	EGP/t		117
Trader's margin (10% of price at Delta)	EGP/t		131
Economic Farmgate Price	EGP/t		1,065
Financial Farmgate Price	EGP/t		750
Conversion Factor	EGP/t		1.420

Table 11 Economic Farmgate Price Calculation: Fertilizers (Export)

Item	Unit	Economic Price	
		Urea (N)	TSP (P205)
World Bank Commodities Price Forecast (Ave. 2020-2022 Price: FOB)	US\$/t	477	513
Ocean Freight and Insurance	US\$/t		
Cost FOB Alexandria Port	US\$/t	477	513
Converted to EGP (USD1 = EGP24.38)	EGP/t	11,629	12,507
Handling cost (65LE/ton)(*)	EGP/t		64
Storage fee (1% of CIF)	EGP/t		125
Port fee (50% of storage fee and handling fee)	EGP/t		95
Price at Alexandria Port	EGP/t	11,359	12,224
Transport from Port to Upper Egypt (Beni Suef / Fayoum)	EGP/t		607
Distributor's margin (10% of price at Alexandria)	EGP/t		1,222
Price at Upper Egypt	EGP/t		10,395
Transport from Farm to Upper Egypt	EGP/t		117
Local Distributor's margin (10% of price at Delta)	EGP/t		1,039
Economic Farmgate Price	EGP/t		8,537
Financial Farmgate Price	EGP/t		7,200
Conversion Factor	EGP/t		0.949

Table 12 Calculation of Economic Benefit: Abo Shosha Sub-region: Case 1-A and Case 2-A

Season	Crop	Without Project			With Project (Case 1A: No crop pattern change / Irrigation Improvement)			With Project (Case 2A: Crop pattern change / Irrigation Improvement)			Benefit (EGP)		
		Net income per fed (EGP/fed)	Intensity (%)	Area (fed)	Total Income (EGP)	Net income per fed (EGP/fed)	Intensity (%)	Area (fed)	Total Income (EGP)	Net income per fed (EGP/fed)		Intensity (%)	Area (fed)
Summer	Maize	8,166	63	10,476	85,550,919	10,265	63	10,476	107,541,046	21,990,127	60	9,978	102,420,043
	Sorghum	5,496	13	2,162	11,881,324	7,111	13	2,162	15,372,652	3,491,328	12	1,966	14,190,140
	Tomatoes	16,296	24	3,991	65,037,975	18,968	24	3,991	75,702,032	10,664,057	28	4,656	88,319,037
	Total			16,629	162,470,217	18,968		16,629	198,615,729	36,145,512		16,629	204,929,220
	Cultivated Area			17,881				17,881					
Winter	Maize	8,166	49	13,114	10,732,194	10,265	49	13,114	13,490,812	2,758,618	41	1,100	11,288,231
	Tomatoes	16,296	15	1,368	22,291,241	18,968	15	1,368	25,946,261	3,655,019	59	1,582	30,016,263
	Total			2,692	33,023,435	18,968		2,692	39,437,073	6,413,638		2,682	41,304,493
	Cultivated Area			17,881				17,881					
	Cropping Intensity (%)			15%				15%					15%
Nile	Wheat	20,023	51	8,025	160,684,431	22,402	51	8,025	179,775,889	19,091,458	51	8,025	179,775,889
	Berseem	4,629	23	3,619	16,752,881	5,497	23	3,619	19,894,272	3,141,391	21	3,304	18,164,335
	Sugarbeet	12,970	7	1,101	14,286,061	13,938	7	1,101	15,352,283	1,066,223	88	1,101	15,352,283
	Onion	19,992	19	2,980	59,770,146	22,643	19	2,980	67,695,850	7,925,703	21	3,304	74,821,728
	Total			15,735	251,493,518	22,643		15,735	282,718,293	31,224,775		15,735	288,114,236
Total Cultivated Area (fed)	Cultivated Area			17,881				17,881					
	Cropping Intensity (%)			88%				88%					88%
	Total Cultivated Area (fed)			35,047	446,987,171			35,047	520,771,095	73,783,924		35,047	534,347,949
	Cropping Intensity (%)			196%				196%					196%
	Total Benefit (EGP)												87,560,778

Table 13 Calculation of Economic Benefit: Abo Shosha Sub-region: Case 1-B and Case 2-B

Season	Crop	Without Project			With Project (Case 1B: No crop pattern change / MOI)			With Project (Case 2B: Crop pattern change / MOI)			Benefit (EGP)		
		Net income per fed (EGP/fed)	Intensity (%)	Area (fed)	Total Income (EGP)	Net income per fed (EGP/fed)	Intensity (%)	Area (fed)	Total Income (EGP)	Net income per fed (EGP/fed)		Intensity (%)	Area (fed)
Summer	Maize	8,166	63	1,048	8,555,092	12,597	63	1,048	13,197,219	4,642,127	60	998	12,568,780
	Sorghum	5,496	13	216	1,188,132	8,898	13	216	1,923,581	735,449	200	200	1,775,613
	Tomatoes	16,296	24	399	6,503,797	28,833	24	399	11,507,363	5,003,566	28	466	13,425,257
	Total			1,663	16,247,022	28,833		1,663	26,628,164	10,381,142		1,663	27,769,651
	Cultivated Area			1,788				1,788					
Nile	Maize	8,166	49	1,311	1,073,219	12,597	49	1,311	1,655,965	582,346	41	110	1,385,269
	Tomatoes	16,296	15	137	2,229,124	28,833	15	137	3,944,056	1,714,932	59	158	4,562,731
	Total			2,688	3,302,344	28,833		2,688	5,599,621	2,297,278		2,688	5,948,000
	Cultivated Area			1,788				1,788					
	Cropping Intensity (%)			15%				15%					15%
Winter	Wheat	20,023	51	802	16,068,443	23,785	51	802	19,087,445	3,019,002	51	802	19,087,445
	Berseem	4,629	23	362	1,675,288	6,509	23	362	2,355,682	680,394	21	330	2,150,840
	Sugarbeet	12,970	7	110	1,428,606	19,856	7	110	2,187,078	758,472	7	110	2,187,078
	Onion	19,992	19	299	5,977,015	31,806	19	299	9,509,050	3,532,035	21	330	10,510,003
	Total			1,574	25,149,352	31,806		1,574	33,139,255	7,989,903		1,574	33,935,366
Total Cultivated Area (fed)	Cultivated Area			1,788				1,788					
	Cropping Intensity (%)			88%				88%					88%
	Total Cultivated Area (fed)			3,505	44,688,717			3,505	65,367,040	20,668,323		3,505	67,653,017
	Cropping Intensity (%)			196%				196%					196%
	Total Benefit (EGP)												22,954,300

Table 14 Calculation of Economic Benefit: Abo Shosha Sub-region: Case 1-C and Case 2-C

Season	Crop	Without Project					With Project (Case 1C: No CP Change / Irrigation Improvement + MOI)					With Project (Case 2C: CP Change / Irrigation Improvement + MOI)				
		Net income per fed (EGP/fed)	Intensity (%)	Area (fed)	Total Income (EGP)	Benefit (EGP)	Net income per fed (EGP/fed)	Intensity (%)	Area (fed)	Total Income (EGP)	Benefit (EGP)	Net income per fed (EGP/fed)	Intensity (%)	Area (fed)	Total Income (EGP)	Benefit (EGP)
Summer	Maize	8,166	63	9,429	76,985,827	19,791,114	63	9,429	96,786,941	19,791,114	10,265	60	8,980	92,178,039	15,182,212	
	Sorghum	5,496	93	1,946	10,693,191	3,142,195	13	1,946	13,835,386	3,142,195	7,111	12	1,796	12,771,126	2,077,935	
	Tomatoes	16,296	24	3,592	58,534,177	9,597,651	24	3,592	68,131,828	9,597,651	18,968	28	4,191	79,487,133	20,952,956	
	Total			14,966	146,223,195	32,530,961		14,966	178,754,156	32,530,961	18,968		14,966	184,436,298	38,213,103	
Nile	Cultivated Area			93%		16,093		93%		16,093			93%			
	Cropping Intensity (%)	8,166	15	1,183	9,668,975	2,482,756	49	1,183	12,141,731	2,482,756	10,265	41	990	10,159,408	500,433	
	Maize	16,296	51	1,231	20,062,117	3,289,518	51	1,231	23,351,635	3,289,518	18,968	59	1,424	27,014,636	6,952,519	
	Total			2,414	29,721,092	5,772,274		2,414	35,493,366	5,772,274	18,968		2,414	37,174,044	7,452,952	
Winter	Cultivated Area			15%		16,093		15%		16,093			15%			
	Cropping Intensity (%)	20,023	88	7,222	144,615,988	17,182,312	51	7,222	161,798,300	17,182,312	22,402	51	7,222	161,798,300	17,182,312	
	Wheat	4,629	23	3,257	15,077,593	2,627,252	23	3,257	17,904,845	2,627,252	5,497	21	2,974	16,347,902	1,270,309	
	Total	12,970	88	991	12,857,455	959,600	7	991	13,817,055	959,600	13,938	7	991	13,817,055	959,600	
Total Cultivated Area (fed)	Cultivated Area	19,992	19	2,691	53,793,132	22,643	19	2,691	60,926,265	7,133,133	22,643	21	2,974	67,339,556	13,546,424	
	Cropping Intensity (%)	14,162		16,093	226,344,167	28,102,297		14,162	254,446,464	28,102,297			14,162	259,302,812	32,936,645	
	Maize			88%				88%					88%			
	Total	31,542	196%	402,288,454		66,405,532		31,542	468,693,996		66,405,532		31,542	480,913,154	78,624,700	
Total Net Increment (LE)	Cultivated Area (fed)			196%		402,288,454		196%		468,693,996		196%		480,913,154	78,624,700	
	Cropping Intensity (%)															
	Without Project	Net income per fed (EGP/fed)	Intensity (%)	Area (fed)	Total Income (EGP)	Benefit (EGP)	Net income per fed (EGP/fed)	Intensity (%)	Area (fed)	Total Income (EGP)	Benefit (EGP)	Net income per fed (EGP/fed)	Intensity (%)	Area (fed)	Total Income (EGP)	Benefit (EGP)
	With Project	Net income per fed (EGP/fed)	Intensity (%)	Area (fed)	Total Income (EGP)	Benefit (EGP)	Net income per fed (EGP/fed)	Intensity (%)	Area (fed)	Total Income (EGP)	Benefit (EGP)	Net income per fed (EGP/fed)	Intensity (%)	Area (fed)	Total Income (EGP)	Benefit (EGP)
Summer	Maize	8,166	63	1,048	8,555,092	15,255	63	1,048	15,981,867	7,426,718	15,255	60	998	15,220,826	6,665,734	
	Sorghum	5,496	93	216	1,188,132	10,944	13	216	2,365,888	1,177,756	10,944	12	200	2,183,897	995,764	
	Tomatoes	16,296	24	3,999	6,503,797	32,173	24	3,999	12,840,370	6,336,573	32,173	28	466	14,960,432	8,476,635	
	Total			1,663	16,247,022	14,941,104		1,663	31,188,125	14,941,104	32,173		1,663	32,385,155	16,138,133	
Nile	Cultivated Area			93%		1,788		93%		1,788			93%			
	Cropping Intensity (%)	8,166	15	1,31	1,073,219	15,255	49	1,31	2,004,894	831,674	15,255	41	110	1,677,564	604,345	
	Maize	16,296	51	1,37	2,229,124	32,173	51	1,37	4,400,933	2,171,509	32,173	59	158	5,091,276	2,862,152	
	Total			2,68	3,302,344	3,103,484		2,68	6,405,827	3,103,484	32,173		2,68	6,768,840	3,466,496	
Winter	Cultivated Area			15%		1,788		15%		1,788			15%			
	Cropping Intensity (%)	20,023	88	802	16,088,443	26,429	51	802	21,209,253	5,140,810	26,429	51	802	21,209,253	5,140,810	
	Wheat	4,629	23	362	1,675,288	7,576	23	362	2,741,841	1,066,553	7,576	21	330	2,503,420	828,132	
	Total	12,970	88	1,110	14,286,066	21,211	7	1,110	2,336,327	907,721	21,211	7	1,110	2,336,327	907,721	
Total Net Increment (LE)	Cultivated Area	19,992	19	2,999	59,777,015	35,121	19	2,999	10,500,137	4,523,122	35,121	21	330	11,605,414	5,628,400	
	Cropping Intensity (%)	15,744		1,788	25,149,352	11,638,206		15,744	36,787,558	11,638,206			15,744	37,654,415	12,505,063	
	Maize			88%				88%					88%			
	Total	31,542	196%	74,381,511	29,682,794	96,088,326		31,542	110,734,393		96,088,326		31,542	110,734,393		

Table 15 Calculation of Economic Benefit: Aros & Abo Seer Sub-region: Case 1-A and Case 2-A

Season	Crop	Without Project				With Project (Case 1A: No crop pattern change / Irrigation Improvement)				With Project (Case 2A: Crop pattern change / Irrigation Improvement)					
		Net income per fed (EGP/fed)	Intensity (%)	Area (fed)	Total Income (EGP)	Net income per fed (EGP/fed)	Intensity (%)	Area (fed)	Total Income (EGP)	Benefit (EGP)	Net income per fed (EGP/fed)	Intensity (%)	Area (fed)	Total Income (EGP)	Benefit (EGP)
Summer	Maize	8,166	93	7,810	63,776,844	10,265	63	7,810	80,170,132	16,393,289	10,265	60	7,438	76,352,507	12,575,663
	Sorghum	5,496	93	1,612	8,957,337	7,111	13	1,612	11,460,066	2,602,729	7,111	12	1,488	10,578,523	1,721,186
	Tomatoes	16,296	24	2,975	48,484,772	18,968	24	2,975	56,434,656	7,949,884	18,968	28	3,471	65,840,432	17,355,660
	Total			12,397	121,118,953			12,397	148,084,855	26,945,902			12,397	152,771,462	31,652,509
	Cultivated Area			13,330				13,330						13,330	
Cropping Intensity (%)		8,166	15	980	8,000,679	10,265	48	980	10,057,185	2,056,506	93%		820	8,415,196	414,516
Nile	Tomatoes	16,296	51	1,020	16,617,765	18,968	51	1,020	19,342,523	2,724,759	18,968	59	1,180	22,376,644	5,758,860
	Total			2,000	24,618,444			2,000	29,399,708	4,781,264			2,000	30,791,840	6,173,396
	Cultivated Area			13,330				13,330					13,330		
Cropping Intensity (%)		20,023	88	5,983	119,787,678	22,402	51	5,983	134,020,055	14,232,377	22,402	51	5,983	134,020,055	14,232,377
Winter	Berseem	4,629	88	2,698	12,489,005	5,497	23	2,698	14,830,862	2,341,857	5,497	21	2,463	13,541,222	1,052,217
	Sugarbeet	12,970	7	821	10,650,030	13,938	7	821	11,444,882	794,852	13,938	7	821	11,444,882	794,852
	Onion	19,982	19	2,229	44,557,690	22,643	19	2,229	50,466,175	5,908,485	22,643	21	2,463	55,778,404	11,220,714
	Total			11,730	187,484,403			11,730	210,761,974	23,277,571			11,730	214,784,562	27,300,160
	Cultivated Area			13,330				13,330					13,330		
Cropping Intensity (%)		16,138	5	1,968	31,751,644	18,810	41	1,968	37,008,825	5,257,181	18,810	71	3,407	64,088,454	32,336,810
Total Cultivated Area (fed)				26,127	333,221,799			26,127	388,226,536	55,004,737			26,127	388,347,864	65,126,065
	Cropping Intensity (%)				196%			196%					196%		

Table 16 Calculation of Economic Benefit: Kased Sub-region: Case 1-A and Case 2-A

Season	Crop	Without Project				With Project (Case 1A: No crop pattern change / Irrigation Improvement)				With Project (Case 2A: Crop pattern change / Irrigation Improvement)					
		Net income per fed (EGP/fed)	Intensity (%)	Area (fed)	Total Income (EGP)	Net income per fed (EGP/fed)	Intensity (%)	Area (fed)	Total Income (EGP)	Benefit (EGP)	Net income per fed (EGP/fed)	Intensity (%)	Area (fed)	Total Income (EGP)	Benefit (EGP)
Summer	Maize	7,471	100	32,632	243,792,477	9,475	34	32,632	309,186,684	65,394,207	9,475	28	26,873	254,624,328	10,831,851
	Rice	7,153	100	9,598	68,651,633	8,051	10	9,598	77,270,278	8,616,645	8,051	10	9,598	77,270,278	8,616,645
	Tomatoes	16,138	56	53,747	867,381,985	18,810	56	53,747	1,010,972,794	143,610,008	18,810	62	59,505	1,119,291,307	251,929,322
	Total			95,976	1,179,806,095			95,976	1,397,429,755	217,623,660			95,976	1,451,185,913	271,379,818
	Cultivated Area			95,976				95,976					95,976		
Cropping Intensity (%)		7,471	5	2,831	21,152,583	9,475	59	2,831	26,826,492	5,673,909	9,475	29	1,392	13,185,903	-7,966,690
Nile	Maize	16,138	41	1,968	31,751,644	18,810	41	1,968	37,008,825	5,257,181	18,810	71	3,407	64,088,454	32,336,810
	Total			4,799	52,904,227			4,799	63,835,317	10,931,091			4,799	77,274,357	24,370,130
	Cultivated Area			95,976				95,976					95,976		
Cropping Intensity (%)		19,240		41,942	806,954,691	21,554	46	41,942	904,007,350	97,052,659	21,554	46	41,942	904,007,350	97,052,659
Winter	Berseem	4,582	95	20,971	96,088,004	5,450	23	20,971	114,290,620	18,202,616	5,450	20	18,235	99,383,148	3,295,144
	Sugarbeet	12,107	17	15,500	187,680,001	13,036	17	15,500	202,059,616	14,399,616	13,036	17	15,500	202,059,616	14,399,616
	Onion	19,897	14	12,765	253,981,385	22,548	14	12,765	287,820,891	33,839,506	22,548	17	15,500	349,496,796	95,515,411
Total			91,177	1,344,684,081			91,177	1,508,178,477	163,494,396			91,177	1,554,946,910	210,262,829	
Cultivated Area			95,976				95,976					95,976			
Cropping Intensity (%)		16,138	95%	191,952	2,577,394,402	18,810	95%	191,952	2,869,443,549	392,049,147	18,810	95%	191,952	3,083,407,179	506,012,777
Total Cultivated Area (fed)				191,952	2,577,394,402			191,952	2,869,443,549	392,049,147			191,952	3,083,407,179	506,012,777
	Cropping Intensity (%)				200%			200%					200%		

Table 17. Calculation of Economic Benefit: Kased Sub-region: Case 1-B and Case 2-B

Season	Crop	Without Project				With Project (Case 1B: No crop pattern change / MOI)				With Project (Case 2B: Crop pattern change / MOI)				Benefit (EGP)	Benefit (EGP)
		Net Income per fed (EGP/fed)	Intensity (%)	Area (fed)	Total Income (EGP)	Net Income per fed (EGP/fed)	Intensity (%)	Area (fed)	Total Income (EGP)	Net Income per fed (EGP/fed)	Intensity (%)	Area (fed)	Total Income (EGP)		
Summer	Maize	7,471	34	3,263	24,379,248	11,766	34	3,263	38,394,623	14,015,375	28	2,687	31,619,101	7,239,854	
	Rice	7,153	100	960	6,865,163	7,153	100	960	6,865,163	0	10	960	6,865,163	0	
	Tomatoes	16,138	56	5,375	86,736,199	28,730	56	5,375	154,413,867	67,677,668	62	9,598	170,958,210	84,222,011	
	Total	19,897		9,598	117,980,609	28,730		9,598	199,673,653	81,683,044			209,442,474	91,461,865	
	Cultivated Area			100%				100%					100%		
Nile	Maize	7,471	59	283	2,115,258	11,766	59	283	3,331,298	1,216,040	29	139	1,637,418	-477,841	
	Tomatoes	16,138	41	197	3,175,164	28,730	41	197	5,652,650	2,477,486	71	341	9,788,736	6,613,572	
	Total	19,897		480	5,290,423	28,730		480	8,983,949	3,693,526		480	11,426,154	6,135,731	
	Cultivated Area			5%				5%					5%		
	Cropping Intensity (%)														
Winter	Wheat	19,240	46	4,194	80,695,469	22,940	46	4,194	96,213,829	15,518,359	46	4,194	96,213,829	15,518,359	
	Berseem	4,582	23	2,097	9,608,800	6,478	23	2,097	13,584,856	3,976,055	20	1,824	11,812,918	2,204,113	
	Sugarbeet	12,107	95	1,550	18,765,000	18,775	95	1,550	29,107,483	10,335,483	17	1,550	29,107,483	10,335,483	
	Onion	19,897	14	1,276	25,398,138	31,745	14	1,276	40,524,883	15,123,745	17	1,550	49,205,144	23,807,005	
	Total	19,897		9,598	134,468,408	31,745		9,598	179,422,050	44,953,642			186,333,373	51,864,965	
Total Cultivated Area (fed)	Cultivated Area			95%				95%					95%		
	Cropping Intensity (%)														
	Total Cultivated Area (fed)			191,959	257,739,440			191,959	388,079,652	130,340,212			407,202,001	149,462,561	
	Cropping Intensity (%)			200%				200%					200%		

Table 18. Calculation of Economic Benefit: Kased Sub-region: Case 1-C and Case 2-C

Season	Crop	Without Project				With Project (Case 1A: No crop pattern change / Irrigation Improvement)				With Project (Case 2A: Crop pattern change / Irrigation Improvement)				Benefit (EGP)	Benefit (EGP)
		Net Income per fed (EGP/fed)	Intensity (%)	Area (fed)	Total Income (EGP)	Net Income per fed (EGP/fed)	Intensity (%)	Area (fed)	Total Income (EGP)	Net Income per fed (EGP/fed)	Intensity (%)	Area (fed)	Total Income (EGP)		
Summer	Maize	7,471	34	29,369	219,413,229	9,475	34	29,369	278,268,016	58,854,787	28	24,186	229,161,895	9,748,666	
	Rice	7,153	100	8,638	61,786,470	8,051	100	8,638	69,543,250	7,756,780	10	8,638	69,543,250	7,756,780	
	Tomatoes	16,138	56	48,372	780,925,787	18,810	56	48,372	909,875,514	129,249,727	62	53,555	1,007,362,176	226,736,390	
	Total	19,897		86,378	1,061,925,485	18,810		86,378	1,257,686,790	195,861,294			1,306,067,322	244,241,936	
	Cultivated Area			86.378				86.378					86.378		
Nile	Maize	7,471	59	2,548	19,037,324	9,475	59	2,548	24,143,843	5,106,518	29	1,252	11,867,312	-7,170,012	
	Tomatoes	16,138	41	1,771	28,576,480	18,810	41	1,771	33,307,943	4,731,463	71	3,066	57,679,608	29,103,129	
	Total	19,897		4,319	47,613,804	18,810		4,319	57,451,785	9,837,981		4,319	69,546,921	21,933,117	
	Cultivated Area			86.378				86.378					86.378		
	Cropping Intensity (%)			5%				5%					5%		
Winter	Wheat	19,240	46	37,747	726,259,222	21,554	46	37,747	813,606,615	87,347,393	46	37,747	813,606,615	87,347,393	
	Berseem	4,582	23	18,874	86,479,204	5,450	23	18,874	102,861,588	16,382,355	20	16,412	89,444,833	2,965,630	
	Sugarbeet	12,107	95	13,950	168,894,001	13,036	95	13,950	181,853,655	12,659,654	17	13,950	181,853,655	12,659,654	
	Onion	19,897	14	11,488	228,583,246	22,548	14	11,488	259,038,802	30,455,555	17	13,950	314,547,116	85,963,870	
	Total	19,897		82,059	1,210,215,673	22,548		82,059	1,357,360,629	147,144,957			1,399,452,219	189,236,546	
Total Cultivated Area (fed)	Cultivated Area			86.378				86.378					86.378		
	Cropping Intensity (%)			95%				95%					95%		
	Total Cultivated Area (fed)			172,737	2,319,654,982			172,737	2,672,499,195	352,844,232			2,775,066,461	455,411,499	
	Cropping Intensity (%)			200%				200%					200%		

Table 19 Calculation of EIRR: Case 1-A

	Cost				Benefit (IP)	Net Return	Net Present Value				
	Investment	O&M	Replace Drip	Total			Discount	Cost	Benefit	Difference	
1	273,864,230	5,305,888		279,170,118	0	-279,170,118	0.9090909	253,791,016	0	-253,791,016	
2	736,392,982	22,625,460		759,018,442	0	-759,018,442	0.8264463	627,287,969	0	-627,287,969	
3	736,392,982	39,945,032		776,338,014	86,806,301	-689,531,713	0.7513148	583,274,240	65,218,859	-518,055,381	
4	736,392,982	57,264,604		793,657,586	260,418,904	-533,238,682	0.6830135	542,078,810	177,869,616	-364,209,195	
5	0	57,264,604		57,264,604	434,031,507	376,766,903	0.6209213	35,556,814	269,499,418	233,942,604	
6	0	57,264,604		57,264,604	520,837,809	463,573,205	0.5644739	32,324,376	293,999,365	261,674,989	
7	0	57,264,604		57,264,604	520,837,809	463,573,205	0.5131581	29,385,796	267,272,150	237,886,353	
8	0	57,264,604		57,264,604	520,837,809	463,573,205	0.4665074	26,714,360	242,974,682	216,260,321	
9	0	57,264,604		57,264,604	520,837,809	463,573,205	0.4240976	24,285,782	220,886,074	196,600,292	
10	0	57,264,604		57,264,604	520,837,809	463,573,205	0.3855433	22,077,984	200,805,522	178,727,538	
11	0	57,264,604		57,264,604	520,837,809	463,573,205	0.3504939	20,070,894	182,550,475	162,479,580	
12	0	57,264,604		57,264,604	520,837,809	463,573,205	0.3186308	18,246,268	165,954,977	147,708,709	
13	0	57,264,604		57,264,604	520,837,809	463,573,205	0.2896644	16,587,516	150,868,161	134,280,645	
14	0	57,264,604		57,264,604	520,837,809	463,573,205	0.2633313	15,079,560	137,152,873	122,073,313	
15	0	57,264,604		57,264,604	520,837,809	463,573,205	0.2393920	13,708,691	124,684,430	110,975,740	
16	0	57,264,604		57,264,604	520,837,809	463,573,205	0.2176291	12,462,446	113,349,482	100,887,036	
17	0	57,264,604		57,264,604	520,837,809	463,573,205	0.1978447	11,329,497	103,044,984	91,715,487	
18	0	57,264,604		57,264,604	520,837,809	463,573,205	0.1798588	10,299,542	93,677,258	83,377,716	
19	0	57,264,604		57,264,604	520,837,809	463,573,205	0.1635080	9,363,220	85,161,144	75,797,923	
20	0	57,264,604		57,264,604	520,837,809	463,573,205	0.1486436	8,512,018	77,419,222	68,907,203	
21	0	57,264,604		57,264,604	520,837,809	463,573,205	0.1351306	7,738,199	70,381,110	62,642,912	
22	0	57,264,604		57,264,604	520,837,809	463,573,205	0.1228460	7,034,726	63,982,828	56,948,102	
23	0	57,264,604		57,264,604	520,837,809	463,573,205	0.1116782	6,395,205	58,166,207	51,771,002	
24	0	57,264,604		57,264,604	520,837,809	463,573,205	0.1015256	5,813,823	52,878,370	47,064,547	
25	0	57,264,604		57,264,604	520,837,809	463,573,205	0.0922960	5,285,294	48,071,245	42,785,952	
26	0	57,264,604		57,264,604	520,837,809	463,573,205	0.0839055	4,804,813	43,701,132	38,896,320	
27	0	57,264,604		57,264,604	520,837,809	463,573,205	0.0762777	4,368,011	39,728,302	35,360,291	
28	0	57,264,604		57,264,604	520,837,809	463,573,205	0.0693433	3,970,919	36,116,638	32,145,719	
29	0	57,264,604		57,264,604	520,837,809	463,573,205	0.0630394	3,609,927	32,833,307	29,223,381	
30	0	57,264,604		57,264,604	520,837,809	463,573,205	0.0573086	3,281,752	29,848,461	26,566,710	
Total	2,483,043,176	1,614,020,688	0	4,097,063,864	13,802,201,932	9,705,138,068		2,364,739,470	3,448,096,292	1,083,356,822	
								Discount rate:	10%	IRR:	15.9%

Table 20 Calculation of EIRR: Case 2-A

Year	Cost				Benefit (IP)	Net Return	Net Present Value				
	Investment	O&M	Replace Drip	Total			Discount	Cost	Benefit	Difference	
1	273,864,230	5,305,888		279,170,118	0	-279,170,118	0.9090909	253,791,016	0	-253,791,016	
2	736,392,982	22,625,460		759,018,442	0	-759,018,442	0.8264463	627,287,969	0	-627,287,969	
3	736,392,982	39,945,032		776,338,014	109,749,937	-666,588,077	0.7513148	583,274,240	82,456,752	-500,817,489	
4	736,392,982	57,264,604		793,657,586	329,249,810	-464,407,776	0.6830135	542,078,810	224,882,050	-317,196,760	
5	0	57,264,604		57,264,604	548,749,683	491,485,079	0.6209213	35,556,814	340,730,379	305,173,566	
6	0	57,264,604		57,264,604	658,499,620	601,235,016	0.5644739	32,324,376	371,705,869	339,381,492	
7	0	57,264,604		57,264,604	658,499,620	601,235,016	0.5131581	29,385,796	337,914,426	308,528,630	
8	0	57,264,604		57,264,604	658,499,620	601,235,016	0.4665074	26,714,360	307,194,933	280,480,572	
9	0	57,264,604		57,264,604	658,499,620	601,235,016	0.4240976	24,285,782	279,268,121	254,982,338	
10	0	57,264,604		57,264,604	658,499,620	601,235,016	0.3855433	22,077,984	253,880,110	231,802,126	
11	0	57,264,604		57,264,604	658,499,620	601,235,016	0.3504939	20,070,894	230,800,100	210,729,205	
12	0	57,264,604		57,264,604	658,499,620	601,235,016	0.3186308	18,246,268	209,818,272	191,572,005	
13	0	57,264,604		57,264,604	658,499,620	601,235,016	0.2896644	16,587,516	190,743,884	174,156,368	
14	0	57,264,604		57,264,604	658,499,620	601,235,016	0.2633313	15,079,560	173,403,531	158,323,971	
15	0	57,264,604		57,264,604	658,499,620	601,235,016	0.2393920	13,708,691	157,639,574	143,930,883	
16	0	57,264,604		57,264,604	658,499,620	601,235,016	0.2176291	12,462,446	143,308,703	130,846,257	
17	0	57,264,604		57,264,604	658,499,620	601,235,016	0.1978447	11,329,497	130,280,639	118,951,143	
18	0	57,264,604		57,264,604	658,499,620	601,235,016	0.1798588	10,299,542	118,436,945	108,137,402	
19	0	57,264,604		57,264,604	658,499,620	601,235,016	0.1635080	9,363,220	107,669,950	98,306,730	
20	0	57,264,604		57,264,604	658,499,620	601,235,016	0.1486436	8,512,018	97,881,773	89,369,754	
21	0	57,264,604		57,264,604	658,499,620	601,235,016	0.1351306	7,738,199	88,983,430	81,245,231	
22	0	57,264,604		57,264,604	658,499,620	601,235,016	0.1228460	7,034,726	80,894,027	73,859,301	
23	0	57,264,604		57,264,604	658,499,620	601,235,016	0.1116782	6,395,205	73,540,024	67,144,819	
24	0	57,264,604		57,264,604	658,499,620	601,235,016	0.1015256	5,813,823	66,854,568	61,040,745	
25	0	57,264,604		57,264,604	658,499,620	601,235,016	0.0922960	5,285,294	60,776,880	55,491,586	
26	0	57,264,604		57,264,604	658,499,620	601,235,016	0.0839055	4,804,813	55,251,709	50,446,896	
27	0	57,264,604		57,264,604	658,499,620	601,235,016	0.0762777	4,368,011	50,228,826	45,860,815	
28	0	57,264,604		57,264,604	658,499,620	601,235,016	0.0693433	3,970,919	45,662,569	41,691,650	
29	0	57,264,604		57,264,604	658,499,620	601,235,016	0.0630394	3,609,927	41,511,427	37,901,500	
30	0	57,264,604		57,264,604	658,499,620	601,235,016	0.0573086	3,281,752	37,737,661	34,455,909	
Total	2,483,043,176	1,614,020,688	0	4,097,063,864	17,450,239,935	13,353,176,071		2,364,739,470	4,359,457,130	1,994,717,660	
								Discount rate:	10%	IRR:	20.3%

Table 21 Calculation of EIRR: Case 1-B

	Cost				Benefit (IP)	Net Return	Net Present Value			
	Investment	O&M	Replace Drip	Total			Discount	Cost	Benefit	Difference
1	34,603,203	0	0	34,603,203	0	-34,603,203	0.9090909	31,457,457	0	-31,457,457
2	284,162,581	2,226,972	0	286,389,553	0	-286,389,553	0.8264463	236,685,581	0	-236,685,581
3	284,162,581	4,453,944	0	288,616,525	25,168,089	-263,448,436	0.7513148	216,841,867	18,909,158	-197,932,709
4	284,162,581	6,680,916	0	290,843,497	75,504,267	-215,339,229	0.6830135	198,650,022	51,570,430	-147,079,591
5	0	6,680,916	0	6,680,916	125,840,445	119,159,529	0.6209213	4,148,323	78,137,016	73,988,693
6	0	6,680,916	47,054,802	53,735,718	151,008,534	97,272,816	0.5644739	30,332,412	85,240,381	54,907,969
7	0	6,680,916	47,054,802	53,735,718	151,008,534	97,272,816	0.5131581	27,574,920	77,491,255	49,916,335
8	0	6,680,916	47,054,802	53,735,718	151,008,534	97,272,816	0.4665074	25,068,109	70,446,596	45,378,487
9	0	6,680,916	0	6,680,916	151,008,534	144,327,618	0.4240976	2,833,361	64,042,360	61,208,999
10	0	6,680,916	47,054,802	53,735,718	151,008,534	97,272,816	0.3855433	20,717,445	58,220,327	37,502,882
11	0	6,680,916	47,054,802	53,735,718	151,008,534	97,272,816	0.3504939	18,834,041	52,927,570	34,093,529
12	0	6,680,916	47,054,802	53,735,718	151,008,534	97,272,816	0.3186308	17,121,856	48,115,973	30,994,117
13	0	6,680,916	0	6,680,916	151,008,534	144,327,618	0.2896644	1,935,223	43,741,793	41,806,570
14	0	6,680,916	47,054,802	53,735,718	151,008,534	97,272,816	0.2633313	14,150,294	39,765,267	25,614,973
15	0	6,680,916	47,054,802	53,735,718	151,008,534	97,272,816	0.2393920	12,863,904	36,150,242	23,286,339
16	0	6,680,916	47,054,802	53,735,718	151,008,534	97,272,816	0.2176291	11,694,458	32,863,857	21,169,399
17	0	6,680,916	0	6,680,916	151,008,534	144,327,618	0.1978447	1,321,784	29,876,233	28,554,450
18	0	6,680,916	47,054,802	53,735,718	151,008,534	97,272,816	0.1798588	9,664,841	27,160,212	17,495,371
19	0	6,680,916	47,054,802	53,735,718	151,008,534	97,272,816	0.1635080	8,786,219	24,691,102	15,904,883
20	0	6,680,916	47,054,802	53,735,718	151,008,534	97,272,816	0.1486436	7,987,472	22,446,456	14,458,984
21	0	6,680,916	0	6,680,916	151,008,534	144,327,618	0.1351306	902,796	20,405,869	19,503,073
22	0	6,680,916	47,054,802	53,735,718	151,008,534	97,272,816	0.1228460	6,601,217	18,550,790	11,949,574
23	0	6,680,916	47,054,802	53,735,718	151,008,534	97,272,816	0.1116782	6,001,106	16,864,355	10,863,249
24	0	6,680,916	47,054,802	53,735,718	151,008,534	97,272,816	0.1015256	5,455,551	15,331,232	9,875,681
25	0	6,680,916	0	6,680,916	151,008,534	144,327,618	0.0922960	616,622	13,937,483	13,320,862
26	0	6,680,916	47,054,802	53,735,718	151,008,534	97,272,816	0.0839055	4,508,720	12,670,439	8,161,720
27	0	6,680,916	47,054,802	53,735,718	151,008,534	97,272,816	0.0762777	4,098,836	11,518,581	7,419,745
28	0	6,680,916	47,054,802	53,735,718	151,008,534	97,272,816	0.0693433	3,726,215	10,471,438	6,745,223
29	0	6,680,916	0	6,680,916	151,008,534	144,327,618	0.0630394	421,161	9,519,489	9,098,328
30	0	6,680,916	47,054,802	53,735,718	151,008,534	97,272,816	0.0573086	3,079,516	8,654,081	5,574,564
Total	887,090,945	187,065,648	894,041,238	1,968,197,831	4,001,726,157	2,033,528,326		934,081,328	999,719,986	65,638,658
							Discount rate:	10%	IIRR:	11.2%

Table 22 Calculation of EIRR: Case 2-B

Year	Cost				Benefit (IP)	Net Return	Net Present Value			
	Investment	O&M	Replace Drip	Total			Discount	Cost	Benefit	Difference
1	34,603,203	0	0	34,603,203	0	-34,603,203	0.9090909	31,457,457	0	-31,457,457
2	284,162,581	2,226,972	0	286,389,553	0	-286,389,553	0.8264463	236,685,581	0	-236,685,581
3	284,162,581	4,453,944	0	288,616,525	28,736,143	-259,880,381	0.7513148	216,841,867	21,589,890	-195,251,977
4	284,162,581	6,680,916	0	290,843,497	86,208,430	-204,635,066	0.6830135	198,650,022	58,881,518	-139,768,504
5	0	6,680,916	0	6,680,916	143,680,717	136,999,801	0.6209213	4,148,323	89,214,421	85,066,098
6	0	6,680,916	47,054,802	53,735,718	172,416,861	118,681,143	0.5644739	30,332,412	97,324,823	66,992,411
7	0	6,680,916	47,054,802	53,735,718	172,416,861	118,681,143	0.5131581	27,574,920	88,477,112	60,902,192
8	0	6,680,916	47,054,802	53,735,718	172,416,861	118,681,143	0.4665074	25,068,109	80,433,738	55,365,629
9	0	6,680,916	0	6,680,916	172,416,861	165,735,945	0.4240976	2,833,361	73,121,580	70,288,219
10	0	6,680,916	47,054,802	53,735,718	172,416,861	118,681,143	0.3855433	20,717,445	66,474,164	45,756,718
11	0	6,680,916	47,054,802	53,735,718	172,416,861	118,681,143	0.3504939	18,834,041	60,431,058	41,597,016
12	0	6,680,916	47,054,802	53,735,718	172,416,861	118,681,143	0.3186308	17,121,856	54,937,325	37,815,470
13	0	6,680,916	0	6,680,916	172,416,861	165,735,945	0.2896644	1,935,223	49,943,023	48,007,800
14	0	6,680,916	47,054,802	53,735,718	172,416,861	118,681,143	0.2633313	14,150,294	45,402,748	31,252,454
15	0	6,680,916	47,054,802	53,735,718	172,416,861	118,681,143	0.2393920	12,863,904	41,275,226	28,411,322
16	0	6,680,916	47,054,802	53,735,718	172,416,861	118,681,143	0.2176291	11,694,458	37,522,932	25,828,475
17	0	6,680,916	0	6,680,916	172,416,861	165,735,945	0.1978447	1,321,784	34,111,757	32,789,973
18	0	6,680,916	47,054,802	53,735,718	172,416,861	118,681,143	0.1798588	9,664,841	31,010,688	21,345,847
19	0	6,680,916	47,054,802	53,735,718	172,416,861	118,681,143	0.1635080	8,786,219	28,191,534	19,405,315
20	0	6,680,916	47,054,802	53,735,718	172,416,861	118,681,143	0.1486436	7,987,472	25,628,668	17,641,196
21	0	6,680,916	0	6,680,916	172,416,861	165,735,945	0.1351306	902,796	23,298,789	22,395,993
22	0	6,680,916	47,054,802	53,735,718	172,416,861	118,681,143	0.1228460	6,601,217	21,180,717	14,579,501
23	0	6,680,916	47,054,802	53,735,718	172,416,861	118,681,143	0.1116782	6,001,106	19,255,197	13,254,091
24	0	6,680,916	47,054,802	53,735,718	172,416,861	118,681,143	0.1015256	5,455,551	17,504,725	12,049,174
25	0	6,680,916	0	6,680,916	172,416,861	165,735,945	0.0922960	616,622	15,913,386	15,296,764
26	0	6,680,916	47,054,802	53,735,718	172,416,861	118,681,143	0.0839055	4,508,720	14,466,715	9,957,995
27	0	6,680,916	47,054,802	53,735,718	172,416,861	118,681,143	0.0762777	4,098,836	13,151,559	9,052,723
28	0	6,680,916	47,054,802	53,735,718	172,416,861	118,681,143	0.0693433	3,726,215	11,955,963	8,229,748
29	0	6,680,916	0	6,680,916	172,416,861	165,735,945	0.0630394	421,161	10,869,057	10,447,896
30	0	6,680,916	47,054,802	53,735,718	172,416,861	118,681,143	0.0573086	3,079,516	9,880,961	6,801,445
Total	887,090,945	187,065,648	894,041,238	1,968,197,831	4,569,046,806	2,600,848,975		934,081,328	1,141,449,272	207,367,945
							Discount rate:	10%	IIRR:	13.5%

Table 23 Calculation of EIRR: Case 1-C

Year	Cost				Benefit (IP)	Net Return	Net Present Value			
	Investment	O&M	Replace Drip	Total			Discount	Cost	Benefit	Difference
1	308,467,433	5,305,888	0	313,773,321	0	-313,773,321	0.9090909	285,248,473	0	-285,248,473
2	1,020,076,877	24,852,432	0	1,044,929,309	0	-1,044,929,309	0.8264463	863,577,942	0	-863,577,942
3	1,020,076,877	44,398,976	0	1,064,475,853	113,669,072	-950,806,782	0.7513148	799,756,464	85,401,256	-714,355,208
4	1,020,076,877	63,945,520	0	1,084,022,397	341,007,215	-743,015,183	0.6830135	740,401,883	232,912,516	-507,489,368
5	0	63,945,520	0	63,945,520	568,345,358	504,399,838	0.6209213	39,705,137	352,897,751	313,192,614
6	0	63,945,520	47,054,802	111,000,322	682,014,429	571,014,107	0.5644739	62,656,788	384,979,365	322,322,577
7	0	63,945,520	47,054,802	111,000,322	682,014,429	571,014,107	0.5131581	56,960,716	349,981,241	293,020,525
8	0	63,945,520	47,054,802	111,000,322	682,014,429	571,014,107	0.4665074	51,782,469	318,164,765	266,382,295
9	0	63,945,520	0	63,945,520	682,014,429	618,068,909	0.4240976	27,119,143	289,240,695	262,121,552
10	0	63,945,520	47,054,802	111,000,322	682,014,429	571,014,107	0.3855433	42,795,429	262,946,086	220,150,657
11	0	63,945,520	47,054,802	111,000,322	682,014,429	571,014,107	0.3504939	38,904,936	239,041,897	200,136,961
12	0	63,945,520	47,054,802	111,000,322	682,014,429	571,014,107	0.3186308	35,368,123	217,310,815	181,942,692
13	0	63,945,520	0	63,945,520	682,014,429	618,068,909	0.2896644	18,522,739	197,555,287	179,032,547
14	0	63,945,520	47,054,802	111,000,322	682,014,429	571,014,107	0.2633313	29,229,854	179,595,715	150,365,861
15	0	63,945,520	47,054,802	111,000,322	682,014,429	571,014,107	0.2393920	26,572,595	163,268,832	136,696,237
16	0	63,945,520	47,054,802	111,000,322	682,014,429	571,014,107	0.2176291	24,156,904	148,426,211	124,269,307
17	0	63,945,520	0	63,945,520	682,014,429	618,068,909	0.1978447	12,651,280	134,932,919	122,281,639
18	0	63,945,520	47,054,802	111,000,322	682,014,429	571,014,107	0.1798588	19,964,384	122,666,290	102,701,906
19	0	63,945,520	47,054,802	111,000,322	682,014,429	571,014,107	0.1635080	18,149,440	111,514,809	93,365,369
20	0	63,945,520	47,054,802	111,000,322	682,014,429	571,014,107	0.1486436	16,499,491	101,377,099	84,877,609
21	0	63,945,520	0	63,945,520	682,014,429	618,068,909	0.1351306	8,640,995	92,160,999	83,520,005
22	0	63,945,520	47,054,802	111,000,322	682,014,429	571,014,107	0.1228460	13,635,943	83,782,727	70,146,784
23	0	63,945,520	47,054,802	111,000,322	682,014,429	571,014,107	0.1116782	12,396,311	76,166,115	63,769,804
24	0	63,945,520	47,054,802	111,000,322	682,014,429	571,014,107	0.1015256	11,269,374	69,241,923	57,972,549
25	0	63,945,520	0	63,945,520	682,014,429	618,068,909	0.0922960	5,901,916	62,947,202	57,045,287
26	0	63,945,520	47,054,802	111,000,322	682,014,429	571,014,107	0.0839055	9,313,532	57,224,730	47,911,197
27	0	63,945,520	47,054,802	111,000,322	682,014,429	571,014,107	0.0762777	8,466,848	52,022,481	43,555,634
28	0	63,945,520	47,054,802	111,000,322	682,014,429	571,014,107	0.0693433	7,697,134	47,293,165	39,596,031
29	0	63,945,520	0	63,945,520	682,014,429	618,068,909	0.0630394	4,031,088	42,993,786	38,962,699
30	0	63,945,520	47,054,802	111,000,322	682,014,429	571,014,107	0.0573086	6,361,268	39,085,260	32,723,992
Total	3,368,698,065	1,801,086,336	894,041,238	6,063,825,639	18,073,382,369	12,009,556,730		3,297,738,598	4,515,131,937	1,217,393,339
							Discount rate:	10%	IRR:	15.0%

Table 24 Calculation of EIRR: Case 2-C

Year	Cost				Benefit (IP)	Net Return	Net Present Value			
	Investment	O&M	Replace Drip	Total			Discount	Cost	Benefit	Difference
1	308,467,433	5,305,888	0	313,773,321	0	-313,773,321	0.9090909	285,248,473	0	-285,248,473
2	1,020,076,877	24,852,432	0	1,044,929,309	0	-1,044,929,309	0.8264463	863,577,942	0	-863,577,942
3	1,020,076,877	44,398,976	0	1,064,475,853	138,277,227	-926,198,627	0.7513148	799,756,464	103,889,727	-695,866,737
4	1,020,076,877	63,945,520	0	1,084,022,397	414,831,681	-669,190,717	0.6830135	740,401,883	283,335,620	-457,066,264
5	0	63,945,520	0	63,945,520	691,386,134	627,440,614	0.6209213	39,705,137	429,296,393	389,591,256
6	0	63,945,520	47,054,802	111,000,322	829,663,361	718,663,039	0.5644739	62,656,788	468,323,338	405,666,550
7	0	63,945,520	47,054,802	111,000,322	829,663,361	718,663,039	0.5131581	56,960,716	425,748,489	368,787,773
8	0	63,945,520	47,054,802	111,000,322	829,663,361	718,663,039	0.4665074	51,782,469	387,044,081	335,261,612
9	0	63,945,520	0	63,945,520	829,663,361	765,717,841	0.4240976	27,119,143	351,858,256	324,739,113
10	0	63,945,520	47,054,802	111,000,322	829,663,361	718,663,039	0.3855433	42,795,429	319,871,141	277,075,712
11	0	63,945,520	47,054,802	111,000,322	829,663,361	718,663,039	0.3504939	38,904,936	290,791,947	251,887,011
12	0	63,945,520	47,054,802	111,000,322	829,663,361	718,663,039	0.3186308	35,368,123	264,356,315	228,988,192
13	0	63,945,520	0	63,945,520	829,663,361	765,717,841	0.2896644	18,522,739	240,323,923	221,801,184
14	0	63,945,520	47,054,802	111,000,322	829,663,361	718,663,039	0.2633313	29,229,854	218,476,294	189,246,440
15	0	63,945,520	47,054,802	111,000,322	829,663,361	718,663,039	0.2393920	26,572,595	198,614,812	172,042,218
16	0	63,945,520	47,054,802	111,000,322	829,663,361	718,663,039	0.2176291	24,156,904	180,558,920	156,402,016
17	0	63,945,520	0	63,945,520	829,663,361	765,717,841	0.1978447	12,651,280	164,144,473	151,493,193
18	0	63,945,520	47,054,802	111,000,322	829,663,361	718,663,039	0.1798588	19,964,384	149,222,248	129,257,865
19	0	63,945,520	47,054,802	111,000,322	829,663,361	718,663,039	0.1635080	18,149,440	135,656,589	117,507,150
20	0	63,945,520	47,054,802	111,000,322	829,663,361	718,663,039	0.1486436	16,499,491	123,324,172	106,824,681
21	0	63,945,520	0	63,945,520	829,663,361	765,717,841	0.1351306	8,640,995	112,112,884	103,471,889
22	0	63,945,520	47,054,802	111,000,322	829,663,361	718,663,039	0.1228460	13,635,943	101,920,803	88,284,861
23	0	63,945,520	47,054,802	111,000,322	829,663,361	718,663,039	0.1116782	12,396,311	92,655,276	80,258,964
24	0	63,945,520	47,054,802	111,000,322	829,663,361	718,663,039	0.1015256	11,269,374	84,232,069	72,962,695
25	0	63,945,520	0	63,945,520	829,663,361	765,717,841	0.0922960	5,901,916	76,574,608	70,672,692
26	0	63,945,520	47,054,802	111,000,322	829,663,361	718,663,039	0.0839055	9,313,532	69,613,280	60,299,748
27	0	63,945,520	47,054,802	111,000,322	829,663,361	718,663,039	0.0762777	8,466,848	63,284,800	54,817,953
28	0	63,945,520	47,054,802	111,000,322	829,663,361	718,663,039	0.0693433	7,697,134	57,531,636	49,834,502
29	0	63,945,520	0	63,945,520	829,663,361	765,717,841	0.0630394	4,031,088	52,301,488	48,270,400
30	0	63,945,520	47,054,802	111,000,322	829,663,361	718,663,039	0.0573086	6,361,268	47,546,807	41,185,539
Total	3,368,698,065	1,801,086,336	894,041,238	6,063,825,639	21,986,079,072	15,922,253,433		3,297,738,598	5,492,610,390	2,194,871,792
							Discount rate:	10%	IRR:	18.7%

Table 25 Farm Income per Feddan at Financial Price: Wheat (Upper Egypt / Delta)

Item	Unit	Amount Per Feddan				Unit Price (LE/Unit)	Value (LE/feddan)			
		W/O Project	W/ project Case A	W/ Project Case B	W/ Project Case C		W/O Project	W/ project Case A	W/ Project Case B	W/ Project Case C
(A) PRODUCTION COST										
Machinery Operation										
Land Preparation (Tractor) Rent	hour	2.5	2.5	2.5	2.5	300	750	750	750	750
Irrigation (Pumping) fuel	electric / hour	6	6	5.1	5.1	150	900	900	765	765
Harvesting Machine Rent	hour	2	2	2	2	350	700	700	700	700
Threshing Machine (motor fuel)	Liter	2	2	2	2	250	500	500	500	500
Inputs										
Seeds / Seeding	Kg	79	79	79	79	15	1185	1185	1185	1185
Fertilizers										
Urea	Kg	100	100	65	65	9	900	900	585	585
Super Triple Phosphate	Kg	70	70	45.5	45.5	7.2	504	504	327.6	327.6
Pesticides		1	1	1	1	100	100	100	100	100
Labor										
Seed Sowing	Family labor	Man	1	1	1	1	140	140	140	140
	Hired Labor	Man								
Irrigation Operation	Family labor	Man	3	3	1.95	1.95	140	420	273	273
	Hired Labor	Man								
Fertilizing	Family labor	Man	1	1	0.65	0.65	140	140	91	91
	Hired Labor	Man								
Pesticide application	Family labor	Man	1	1	1	1	140	140	140	140
	Hired Labor	Man								
Harvesting	Family labor	Man	1	1.09	1.11	1.21	140	140	155.4	169.4
	Hired Labor	Man	3	3.27	3.33	3.63	140	420	466.2	508.2
Threshing	Family labor	Man	1	1.09	1.11	1.21	140	140	155.4	169.4
	Hired Labor	Man	3	3.27	3.33	3.63	140	420	466.2	508.2
Transporting from farm to truck	Family labor	Man	1	1.09	1.11	1.21	140	140	155.4	169.4
	Hired Labor	Man								
Total Production Cost							7,639	7,752	6,955	7,081
(B) INCOME										
Main Produce	Kg	2,300	2,507	2,553	2,783	6.7	15,410	16,797	17,105	18,646
By Product	Hay	10	10.9	11.1	12.1	600	6,000	6,540	6,660	7,260
Total Gross Income							21,410	23,337	23,765	25,906
(C) Net Return (B) - (A)							13,771	15,585	16,810	18,825
(D) Production Cost without Family Labor Cost							6,379	6,455	5,845	5,929
(E) Net Income (B) - (D)							15,031	16,882	17,920	19,977
Net Return Ratio (%)							64%	67%	71%	73%
Net Income Ratio (%)							70%	72%	75%	77%

Table 26 Farm Income per Feddan at Economic Price: Wheat (Upper Egypt)

Item	Unit	Amount Per Feddan				Unit Price (LE/Unit)	Value (LE/feddan)			
		W/O Project	W/ project Case A	W/ Project Case B	W/ Project Case C		W/O Project	W/ project Case A	W/ Project Case B	W/ Project Case C
(A) PRODUCTION COST										
Machinery Operation										
Land Preparation (Tractor) Rent	hour	2.5	2.5	2.5	2.5	294	735	735	735	735
Irrigation (Pumping) fuel	electric / hour	6	6	5.1	5.1	147	882	882	749.7	749.7
Harvesting Machine Rent	hour	2	2	2	2	343	686	686	686	686
Threshing Machine (motor fuel)	Liter	2	2	2	2	245	490	490	490	490
Inputs										
Seeds / Seeding	Kg	79	79	79	79	15	1185	1185	1185	1185
Fertilizers										
Urea	Kg	100	100	65	65	8.537	853.7	853.7	554.905	554.905
Super Triple Phosphate	Kg	70	70	45.5	45.5	9.239	646.73	646.73	420.3745	420.3745
Pesticides		1	1	1	1	98	98	98	98	98
Labor										
Seed Sowing	Family labor	Man	1	1	1	1	140	140	140	140
	Hired Labor	Man								
Irrigation Operation	Family labor	Man	3	3	1.95	1.95	140	420	273	273
	Hired Labor	Man								
Fertilizing	Family labor	Man	1	1	0.65	0.65	140	140	91	91
	Hired Labor	Man								
Pesticide application	Family labor	Man	1	1	1	1	140	140	140	140
	Hired Labor	Man								
Harvesting	Family labor	Man	1	1.09	1.11	1.21	140	140	152.6	169.4
	Hired Labor	Man	3	3.27	3.33	3.63	140	420	457.8	508.2
Threshing	Family labor	Man	1	1.09	1.11	1.21	140	140	152.6	169.4
	Hired Labor	Man	3	3.27	3.33	3.63	140	420	457.8	508.2
Transporting from farm to truck	Family labor	Man	1	1.09	1.11	1.21	140	140	152.6	169.4
	Hired Labor	Man								
Total Production Cost							7,676	7,790	6,962	7,088
(B) INCOME										
Main Produce	Kg	2,300	2,507	2,553	2,783	9.491	21,829	23,794	24,231	26,413
By Product	Hay	10	10.9	11.1	12.1	587	5,870	6,398	6,516	7,103
Total Gross Income							27,699	30,192	30,746	33,516
(C) Net Return (B) - (A)							20,023	22,402	23,785	26,429
(D) Production Cost without Family Labor Cost							6,416	6,492	5,851	5,935
(E) Net Income (B) - (D)							21,283	23,700	24,895	27,581
Net Return Ratio (%)							72%	74%	77%	79%
Net Income Ratio (%)							77%	78%	81%	82%

Table 27 Farm Income per Feddan at Economic Price: Wheat (Delta)

Item	Unit	Amount Per Feddan				Unit Price (LE/Unit)	Value (LE/feddan)			
		W/O Project	W/ project Case A	W/ Project Case B	W/ Project Case C		W/O Project	W/ project Case A	W/ Project Case B	W/ Project Case C
(A) PRODUCTION COST										
Machinery Operation										
Land Preparation (Tractor) Rent	hour	2.5	2.5	2.5	2.5	294	735	735	735	735
Irrigation (Pumping) fuel	electric / hour	6	6	5.1	5.1	147	882	882	749.7	749.7
Harvesting Machine Rent	hour	2	2	2	2	343	686	686	686	686
Threshing Machine (motor fuel)	Liter	2	2	2	2	245	490	490	490	490
Inputs										
Seeds / Seeding	Kg	79	79	79	79	15	1185	1185	1185	1185
Fertilizers										
Urea	Kg	100	100	65	65	8.854	885.4	885.4	575.51	575.51
Super Triple Phosphate	Kg	70	70	45.5	45.5	9.555	668.85	668.85	434.7525	434.7525
Pesticides		1	1	1	1	98	98	98	98	98
Labor										
Seed Sowing	Family labor	Man	1	1	1	1	140	140	140	140
	Hired Labor	Man								
Irrigation Operation	Family labor	Man	3	3	1.95	1.95	140	420	273	273
	Hired Labor	Man								
Fertilizing	Family labor	Man	1	1	0.65	0.65	140	140	91	91
	Hired Labor	Man								
Pesticide application	Family labor	Man	1	1	1	1	140	140	140	140
	Hired Labor	Man								
Harvesting	Family labor	Man	1	1.09	1.11	1.21	140	140	152.6	169.4
	Hired Labor	Man	3	3.27	3.33	3.63	140	420	457.8	508.2
Threshing	Family labor	Man	1	1.09	1.11	1.21	140	140	152.6	169.4
	Hired Labor	Man	3	3.27	3.33	3.63	140	420	457.8	508.2
Transporting from farm to truck	Family labor	Man	1	1.09	1.11	1.21	140	140	152.6	169.4
	Hired Labor	Man								
Total Production Cost							7,730	7,844	6,997	7,123
(B) INCOME										
Main Produce	Kg	2,300	2,507	2,553	2,783	9.174	21,100	22,999	23,421	25,531
By Product	Hay	10	10.9	11.1	12.1	587	5,870	6,398	6,516	7,103
Total Gross Income							26,970	29,398	29,937	32,634
(C) Net Return (B) - (A)							19,240	21,554	22,940	25,511
(D) Production Cost without Family Labor Cost							6,470	6,546	5,886	5,970
(E) Net Income (B) - (D)							20,500	22,852	24,051	26,664
Net Return Ratio (%)							71%	73%	77%	78%
Net Income Ratio (%)							76%	78%	80%	82%

Table 28 Farm Income per Feddan at Financial Price: Maize (Upper Egypt / Delta)

Item	Unit	Amount Per Feddan				Unit Price (LE/unit)	Value (LE/feddan)			
		W/O Project	W/ project Case A	W/ Project Case B	W/ Project Case C		W/O Project	W/ project Case A	W/ Project Case B	W/ Project Case C
(A) PRODUCTION COST										
Machinery Operation										
Land Preparation (Tractor) Rent	hour	2.5	2.5	2.5	2.5	300	750	750	750	750
Irrigation (Pumping) fuel	electric / hour	3	3	2.55	2.55	150	450	450	383	383
Harvesting Machine Rent	hour or feddan									
Threshing Machine (motor fuel)	hour	1	1	1	1	250	250	250	250	250
Inputs										
Seeds	Kg	23	23	23	23	50	1,150	1,150	1,150	1,150
Fertilizers										
Urea	Kg	100	100	65	65	9	900	900	585	585
Super Triple Phosphate	Kg	100	100	65	65	7.2	720	720	468	468
Pesticides	Liter	1	1	1	1	100	100	100	100	100
Labor										
Land Preparation (Plowing)	Family labor	Man	1	1	1	140	140	140	140	140
	Hired Labor	Man								
Seed Sowing	Family labor	Man	1	1	1	140	140	140	140	140
	Hired Labor	Man	1	1	1	140	140	140	140	140
Irrigation Operation	Family labor	Man	4	4	2.6	2.6	140	560	364	364
	Hired Labor	Man								
Fertilizing	Family labor	Man	1	1	0.65	0.65	140	140	91	91
	Hired Labor	Man								
Pesticide application	Family labor	Man	1	1	1	140	140	140	140	140
	Hired Labor	Man								
Weeding	Family labor	Man	1	1	1	140	140	140	140	140
	Hired Labor	Man								
Harvesting	Family labor	Man	1	1.15	1.25	1.44	140	140	161	175
	Hired Labor	Man	5	5.75	6.25	7.20	140	700	805	875
Threshing	Family labor	Man	1	1.15	1.25	1.44	140	140	161	175
	Hired Labor	Man	1	1.15	1.25	1.44	140	140	161	175
Total Production Cost										
(B) INCOME										
Main Produce	Kg	2000	2300	2500	2880	8	16,000	18,400	20,000	23,040
By Product	Ton									
Total Gross Income										
(C) Net Return (B) - (A)										
(D) Production Cost without Family Labor Cost										
(E) Net Income (B) - (D)										
Net Return Ratio (%)							57%	62%	69%	72%
Net Income Ratio (%)							67%	71%	76%	78%

Table 29 Farm Income per Feddan at Economic Price: Maize (Upper Egypt)

Item	Unit	Amount Per Feddan				Unit Price (LE/unit)	Value (LE/feddan)			
		W/O Project	W/ project Case A	W/ Project Case B	W/ Project Case C		W/O Project	W/ project Case A	W/ Project Case B	W/ Project Case C
(A) PRODUCTION COST										
Machinery Operation										
Land Preparation (Tractor) Rent	hour	2.5	2.5	2.5	2.5	294	735	735	735	735
Irrigation (Pumping) fuel	electric / hour	3	3	2.55	2.55	147	441	441	375	375
Harvesting Machine Rent	hour or feddan						0	0	0	0
Threshing Machine (motor fuel)	hour	1	1	1	1	245	245	245	245	245
Inputs										
Seeds	Kg	23	23	23	23	49	1,127	1,127	1,127	1,127
Fertilizers										
Urea	Kg	100	100	65	65	8.537	854	854	555	555
Super Triple Phosphate	Kg	100	100	65	65	9.239	924	924	601	601
Pesticides	Liter	1	1	1	1	98	98	98	98	98
Labor										
Land Preparation (Plowing)	Family labor	Man	1	1	1	140	140	140	140	140
	Hired Labor	Man								
Seed Sowing	Family labor	Man	1	1	1	140	140	140	140	140
	Hired Labor	Man	1	1	1	140	140	140	140	140
Irrigation Operation	Family labor	Man	4	4	2.6	2.6	140	560	364	364
	Hired Labor	Man								
Fertilizing	Family labor	Man	1	1	0.65	0.65	140	140	91	91
	Hired Labor	Man								
Pesticide application	Family labor	Man	1	1	1	140	140	140	140	140
	Hired Labor	Man								
Weeding	Family labor	Man	1	1	1	140	140	140	140	140
	Hired Labor	Man								
Harvesting	Family labor	Man	1	1.15	1.25	1.44	140	140	161	175
	Hired Labor	Man	5	5.75	6.25	7.20	140	700	805	875
Threshing	Family labor	Man	1	1.15	1.25	1.44	140	140	161	175
	Hired Labor	Man	1	1.15	1.25	1.44	140	140	161	175
Total Production Cost										
(B) INCOME										
Main Produce	Kg	2000	2300	2500	2880	7.555	15,110	17,377	18,888	21,758
By Product	Ton									
Total Gross Income										
(C) Net Return (B) - (A)										
(D) Production Cost without Family Labor Cost										
(E) Net Income (B) - (D)										
Net Return Ratio (%)							54%	59%	67%	70%
Net Income Ratio (%)							64%	68%	74%	77%

Table 30 Farm Income per Feddan at Economic Price: Maize (Delta)

Item	Unit	Amount Per Feddan				Unit Price (LE/unit)	Value (LE/feddan)			
		W/O Project	W/ project Case A	W/ Project Case B	W/ Project Case C		W/O Project	W/ project Case A	W/ Project Case B	W/ Project Case C
(A) PRODUCTION COST										
Machinery Operation										
Land Preparation (Tractor) Rent	hour	2.5	2.5	2.5	2.5	294	735	735	735	735
Irrigation (Pumping) fuel	electric / hour	3	3	2.55	2.55	147	441	441	375	375
Harvesting Machine Rent	hour or feddan									
Threshing Machine (motor fuel)	hour	1	1	1	1	245	245	245	245	245
Inputs										
Seeds	Kg	23	23	23	23	49	1,127	1,127	1,127	1,127
Fertilizers										
Urea	Kg	100	100	65	65	8.854	885	885	576	576
Super Triple Phosphate	Kg	100	100	65	65	9.555	956	956	621	621
Pesticides	Liter	1	1	1	1	98	98	98	98	98
Labor										
Land Preparation (Plowing)	Family labor	Man	1	1	1	140	140	140	140	140
	Hired Labor	Man								
Seed Sowing	Family labor	Man	1	1	1	140	140	140	140	140
	Hired Labor	Man	1	1	1	140	140	140	140	140
Irrigation Operation	Family labor	Man	4	4	2.6	2.6	140	560	364	364
	Hired Labor	Man								
Fertilizing	Family labor	Man	1	1	0.65	0.65	140	140	91	91
	Hired Labor	Man								
Pesticide application	Family labor	Man	1	1	1	140	140	140	140	140
	Hired Labor	Man								
Weeding	Family labor	Man	1	1	1	140	140	140	140	140
	Hired Labor	Man								
Harvesting	Family labor	Man	1	1.15	1.25	1.44	140	140	161	175
	Hired Labor	Man	5	5.75	6.25	7.20	140	700	805	875
Threshing	Family labor	Man	1	1.15	1.25	1.44	140	140	161	175
	Hired Labor	Man	1	1.15	1.25	1.44	140	140	161	175
Total Production Cost										
(B) INCOME										
Main Produce	Kg	2000	2300	2500	2880	7.239	14,478	16,650	18,098	20,848
By Product	Ton									
Total Gross Income										
(C) Net Return (B) - (A)										
(D) Production Cost without Family Labor Cost										
(E) Net Income (B) - (D)										
Net Return Ratio (%)							9.011	11,057	13,131	15,722
Net Income Ratio (%)							62%	66%	73%	75%

Table 31 Farm Income per Feddan at Financial Price: Sorghum (Upper Egypt)

Item	Unit	Amount Per Feddan				Unit Price (LE/unit)	Value (LE/feddan)				
		W/O Project	W/ project Case A	W/ Project Case B	W/ Project Case C		W/O Project	W/ project Case A	W/ Project Case B	W/ Project Case C	
(A) PRODUCTION COST											
Machinery Operation											
Land Preparation (Tractor) Rent	hour	2.5	2.5	2.5	2.5	300	750	750	750	750	
Irrigation (Pumping) fuel	hour/electric	3	3	2.55	2.55	150	450	450	383	383	
Harvesting Machine Rent	hour or feddan										
Threshing Machine (motor fuel)	hour	2	2	1.5	1.5	250	375	375	375	375	
Inputs											
Seeds	Kg	2	2	2	2	700	1,400	1,400	1,400	1,400	
Fertilizers											
Urea	Kg	150	150	97.5	97.5	9	1,350	1,350	878	878	
Super Triple Phosphate	Kg										
Pesticides	Litter	1	1	1	1	100	100	100	100	100	
Labor											
Seed Sowing	Family labor	Man	1	1	1	140	140	140	140	140	
	Hired Labor	Man	1	1	1	140	140	140	140	140	
Irrigation Operation	Family labor	Man	3	3	1.95	1.95	140	420	420	273	
	Hired Labor	Man									
Fertilizing	Family labor	Man	1	1	0.65	0.65	140	140	140	91	
	Hired Labor	Man									
Pesticide application	Family labor	Man	1	1	1	140	140	140	140	140	
	Hired Labor	Man									
Harvesting	Family labor	Man	1	1.15	1.25	1.44	140	140	161	175	
	Hired Labor	Man	4	4.6	5	5.76	140	560	644	700	
Threshing	Family labor	Man	1	1.15	1.25	1.44	140	140	161	175	
	Hired Labor	Man	1	1.15	1.25	1.44	140	140	161	175	
Total Production Cost								6,385	6,532	5,894	6,080
(B) INCOME											
Main Produce	Kg	1,500	1,725	1,875	2,160	8	12,000	13,800	15,000	17,280	
By Product	Ton										
Total Gross Income								12,000	13,800	15,000	17,280
(C) Net Return (B) - (A)								5,615	7,268	9,106	11,200
(D) Production Cost without Family Labor Cost								5,405	5,531	5,075	5,235
(E) Net Income (B) - (D)								6,595	8,269	9,925	12,045
Net Return Ratio (%)								47%	53%	61%	65%
Net Income Ratio (%)								55%	60%	66%	70%

Table 32 Farm Income per Feddan at Economic Price: Sorghum (Upper Egypt)

Item	Unit	Amount Per Feddan				Unit Price (LE/unit)	Value (LE/feddan)				
		W/O Project	W/ project Case A	W/ Project Case B	W/ Project Case C		W/O Project	W/ project Case A	W/ Project Case B	W/ Project Case C	
(A) PRODUCTION COST											
Machinery Operation											
Land Preparation (Tractor) Rent	hour	2.5	2.5	2.5	2.5	294	735	735	735	735	
Irrigation (Pumping) fuel	hour/electric	3	3	2.55	2.55	147	441	441	375	375	
Harvesting Machine Rent	hour or feddan										
Threshing Machine (motor fuel)	hour	2	2	1.5	1.5	245	368	368	368	368	
Inputs											
Seeds	Kg	2	2	2	2	685	1,370	1,370	1,370	1,370	
Fertilizers											
Urea	Kg	150	150	97.5	97.5	9	1,281	1,281	832	832	
Super Triple Phosphate	Kg										
Pesticides	Litter	1	1	1	1	98	98	98	98	98	
Labor											
Seed Sowing	Family labor	Man	1	1	1	140	140	140	140	140	
	Hired Labor	Man	1	1	1	140	140	140	140	140	
Irrigation Operation	Family labor	Man	3	3	1.95	1.95	140	420	420	273	
	Hired Labor	Man									
Fertilizing	Family labor	Man	1	1	0.65	0.65	140	140	140	91	
	Hired Labor	Man									
Pesticide application	Family labor	Man	1	1	1	140	140	140	140	140	
	Hired Labor	Man									
Harvesting	Family labor	Man	1	1.15	1.25	1.44	140	140	161	175	
	Hired Labor	Man	4	4.6	5	5.76	140	560	644	700	
Threshing	Family labor	Man	1	1.15	1.25	1.44	140	140	161	175	
	Hired Labor	Man	1	1.15	1.25	1.44	140	140	161	175	
Total Production Cost								6,252	6,399	5,787	5,973
(B) INCOME											
Main Produce	Kg	1,500	1,725	1,875	2,160	7.832	11,748	13,510	14,685	16,917	
By Product	Ton										
Total Gross Income								11,748	13,510	14,685	16,917
(C) Net Return (B) - (A)								5,496	7,111	8,898	10,944
(D) Production Cost without Family Labor Cost								5,272	5,398	4,968	5,127
(E) Net Income (B) - (D)								6,476	8,112	9,717	11,790
Net Return Ratio (%)								47%	53%	61%	65%
Net Income Ratio (%)								55%	60%	66%	70%

Table 33 Farm Income per Feddan at Financial Price: Berseem (Upper Egypt / Delta)

Item	Unit	Amount Per Feddan				Unit Price (LE/unit)	Value (LE/feddan)			
		W/O Project	W/ project Case A	W/ Project Case B	W/ Project Case C		W/O Project	W/ project Case A	W/ Project Case B	W/ Project Case C
(A) PRODUCTION COST										
Machinery Operation										
Land Preparation (Tractor) Rent	hour	2.5	2.5	2.5	2.5	300	750	750	750	750
Irrigation (Pumping) fuel	hour/electric	4	4	3.4	3.4	150	600	600	510	510
Harvesting Machine Rent	hour or feddan									
Inputs										
Seeds	Kg	10	10	10	10	150	1,500	1,500	1,500	1,500
Fertilizers										
Urea	Kg									
Super Triple Phosphate	Kg	150	150	97.5	97.5	7.2	1,080	1,080	702	702
Pesticides										
Labor										
Seed Sowing	Family labor	Man	1	1	1	1	140	140	140	140
	Hired Labor	Man								
Irrigation Operation	Family labor	Man	4	4	2.6	2.6	140	560	560	364
	Hired Labor	Man								
Fertilizing	Family labor	Man	1	1	0.65	0.65	140	140	140	91
	Hired Labor	Man								
Harvesting	Family labor	Man	5	5.45	5.55	6.21	140	700	763	777
	Hired Labor	Man	10	10.9	11.1	11.21	140	1,400	1,526	1,554
Total Production Cost								6,870	7,059	6,388
(B) INCOME										
Main Produce	Ton	12.00	13.08	13.32	14.52	1000	12,000	13,080	13,320	14,520
By Product	Ton									
Total Gross Income							12,000	13,080	13,320	14,520
(C) Net Return (B) - (A)							5,130	6,021	6,932	8,024
(D) Production Cost without Family Labor Cost							5,330	5,456	5,018	5,031
(E) Net Income (B) - (D)							6,870	7,624	8,304	9,489
Net Return Ratio (%)							43%	46%	52%	55%
Net Income Ratio (%)							56%	58%	62%	65%

Table 34 Farm Income per Feddan at Economic Price: Berseem (Upper Egypt)

Item	Unit	Amount Per Feddan				Unit Price (LE/unit)	Value (LE/feddan)			
		W/O Project	W/ project Case A	W/ Project Case B	W/ Project Case C		W/O Project	W/ project Case A	W/ Project Case B	W/ Project Case C
(A) PRODUCTION COST										
Machinery Operation										
Land Preparation (Tractor) Rent	hour	2.5	2.5	2.5	2.5	294	735	735	735	735
Irrigation (Pumping) fuel	hour/electric	4	4	3.4	3.4	147	588	588	500	500
Harvesting Machine Rent	hour or feddan									
Inputs										
Seeds	Kg	10	10	10	10	147	1,470	1,470	1,470	1,470
Fertilizers										
Urea	Kg									
Super Triple Phosphate	Kg	150	150	97.5	97.5	9.239	1,386	1,386	901	901
Pesticides										
Labor										
Seed Sowing	Family labor	Man	1	1	1	1	140	140	140	140
	Hired Labor	Man								
Irrigation Operation	Family labor	Man	4	4	2.6	2.6	140	560	560	364
	Hired Labor	Man								
Fertilizing	Family labor	Man	1	1	0.65	0.65	140	140	140	91
	Hired Labor	Man								
Harvesting	Family labor	Man	5	5.45	5.55	6.21	140	700	763	777
	Hired Labor	Man	10	10.9	11.1	11.21	140	1,400	1,526	1,554
Total Production Cost							7,119	7,308	6,532	6,639
(B) INCOME										
Main Produce	Ton	12.00	13.08	13.32	14.52	979	11,748	12,805	13,040	14,215
By Product	Ton									
Total Gross Income							11,748	12,805	13,040	14,215
(C) Net Return (B) - (A)							4,629	5,497	6,509	7,576
(D) Production Cost without Family Labor Cost							5,579	5,705	5,160	5,175
(E) Net Income (B) - (D)							6,169	7,100	7,881	9,040
Net Return Ratio (%)							39%	43%	50%	53%
Net Income Ratio (%)							53%	55%	60%	64%

Table 35 Farm Income per Feddan at Economic Price: Berseem (Delta)

Item	Unit	Amount Per Feddan				Unit Price (LE/unit)	Value (LE/feddan)			
		W/O Project	W/ project Case A	W/ Project Case B	W/ Project Case C		W/O Project	W/ project Case A	W/ Project Case B	W/ Project Case C
(A) PRODUCTION COST										
Machinery Operation										
Land Preparation (Tractor) Rent	hour	2.5	2.5	2.5	2.5	294	735	735	735	735
Irrigation (Pumping) fuel	hour/electric	4	4	3.4	3.4	147	588	588	500	500
Harvesting Machine Rent	hour or feddan									
Inputs										
Seeds	Kg	10	10	10	10	147	1,470	1,470	1,470	1,470
Fertilizers										
Urea	Kg									
Super Triple Phosphate	Kg	150	150	97.5	97.5	9.555	1,433	1,433	932	932
Pesticides										
Labor										
Seed Sowing	Family labor	Man	1	1	1	1	140	140	140	140
	Hired Labor	Man								
Irrigation Operation	Family labor	Man	4	4	2.6	2.6	140	560	560	364
	Hired Labor	Man								
Fertilizing	Family labor	Man	1	1	0.65	0.65	140	140	140	91
	Hired Labor	Man								
Harvesting	Family labor	Man	5	5.45	5.55	6.21	140	700	763	777
	Hired Labor	Man	10	10.9	11.1	11.21	140	1,400	1,526	1,554
Total Production Cost							7,166	7,355	6,562	6,670
(B) INCOME										
Main Produce	Ton	12.00	13.08	13.32	14.52	979	11,748	12,805	13,040	14,215
By Product	Ton									
Total Gross Income							11,748	12,805	13,040	14,215
(C) Net Return (B) - (A)							4,582	5,450	6,478	7,545
(D) Production Cost without Family Labor Cost							5,626	5,752	5,190	5,206
(E) Net Income (B) - (D)							6,122	7,053	7,850	9,009
Net Return Ratio (%)							39%	43%	50%	53%
Net Income Ratio (%)							52%	55%	60%	63%

Table 36 Farm Income per Feddan at Financial Price: Sugar beet (Upper Egypt / Delta)

Item	Unit	Amount Per Feddan				Unit Price (LE/unit)	Value (LE/feddan)			
		W/O Project	W/ project Case A	W/ Project Case B	W/ Project Case C		W/O Project	W/ project Case A	W/ Project Case B	W/ Project Case C
(A) PRODUCTION COST										
Machinery Operation										
Land Preparation (Tractor) Rent	hour	2.5	2.5	2.5	2.5	300	750	750	750	750
Irrigation (Pumping) fuel	hour/electric	5	5	4.25	4.25	150	750	750	638	638
Harvesting Machine Rent	hour or feddan									
Inputs										
Seeds	Kg	3	3	3	3	500	1,500	1,500	1,500	1,500
Fertilizers										
Urea	Kg	100	100	65	65	9	900	900	585	585
Super Triple Phosphate	Kg	100	100	65	65	7.2	720	720	468	468
Pesticides										
Labor										
Seed Sowing	Family labor	1	1	1	1	140	140	140	140	140
	Hired Labor	1	1	1	1	140	140	140	140	140
Irrigation Operation	Family labor	5	5	3.25	3.25	140	700	700	455	455
	Hired Labor									
Fertilizing	Family labor	2	2	1.3	1.3	140	280	280	182	182
	Hired Labor									
Weeding	Family labor	1	1	1	1	140	140	140	140	140
	Hired Labor	2	2	2	2	140	280	280	280	280
Harvesting & Hauling to truck	Family labor	2	2.1	2.6	2.74	140	280	294	364	384
	Hired Labor	8	8.4	10.4	10.96	140	1,120	1,176	1,456	1,534
Total Production Cost							7,700	7,770	7,098	7,196
(B) INCOME										
Main Produce	Ton	19.50	20.48	25.35	26.72	750	14,625	15,366	19,013	20,036
By Product	Ton									
Total Gross Income							14,625	15,366	19,013	20,036
(C) Net Return (B) - (A)							6,925	7,586	11,915	12,841
(D) Production Cost without Family Labor Cost							6,160	6,216	5,817	5,895
(E) Net Income (B) - (D)							8,465	9,140	13,196	14,141
Net Return Ratio (%)							47%	49%	63%	64%
Net Income Ratio (%)							58%	60%	69%	71%

Table 37 Farm Income per Feddan at Economic Price: Sugar beet (Upper Egypt)

Item	Unit	Amount Per Feddan				Unit Price (LE/unit)	Value (LE/feddan)			
		W/O Project	W/ project Case A	W/ Project Case B	W/ Project Case C		W/O Project	W/ project Case A	W/ Project Case B	W/ Project Case C
(A) PRODUCTION COST										
Machinery Operation										
Land Preparation (Tractor) Rent	hour	2.5	2.5	2.5	2.5	294	735	735	735	735
Irrigation (Pumping) fuel	hour/electric	5	5	4.25	4.25	147	735	735	625	625
Harvesting Machine Rent	hour or feddan									
Inputs										
Seeds	Kg	3	3	3	3	490	1,470	1,470	1,470	1,470
Fertilizers										
Urea	Kg	100	100	65	65	8.537	854	854	555	555
Super Triple Phosphate	Kg	100	100	65	65	9.239	924	924	601	601
Pesticides										
Labor										
Seed Sowing	Family labor	1	1	1	1	140	140	140	140	140
	Hired Labor	1	1	1	1	140	140	140	140	140
Irrigation Operation	Family labor	5	5	3.25	3.25	140	700	700	455	455
	Hired Labor									
Fertilizing	Family labor	2	2	1.3	1.3	140	280	280	182	182
	Hired Labor									
Weeding	Family labor	1	1	1	1	140	140	140	140	140
	Hired Labor	2	2	2	2	140	280	280	280	280
Harvesting & Hauling to truck	Family labor	2	2.1	2.6	2.74	140	280	294	364	384
	Hired Labor	8	8.4	10.4	10.96	140	1,120	1,176	1,456	1,534
Total Production Cost							7,798	7,868	7,142	7,240
(B) INCOME										
Main Produce	Ton	19.50	20.48	25.35	26.72	1065	20,768	21,806	26,998	28,451
By Product	Ton									
Total Gross Income							20,768	21,806	26,998	28,451
(C) Net Return (B) - (A)							12,970	13,938	19,856	21,211
(D) Production Cost without Family Labor Cost							6,258	6,314	5,861	5,940
(E) Net Income (B) - (D)							14,510	15,492	21,137	22,512
Net Return Ratio (%)							62%	64%	74%	75%
Net Income Ratio (%)							70%	71%	78%	79%

Table 38 Farm Income per Feddan at Economic Price: Sugar beet (Delta)

Item	Unit	Amount Per Feddan				Unit Price (LE/unit)	Value (LE/feddan)			
		W/O Project	W/ project Case A	W/ Project Case B	W/ Project Case C		W/O Project	W/ project Case A	W/ Project Case B	W/ Project Case C
(A) PRODUCTION COST										
Machinery Operation										
Land Preparation (Tractor) Rent	hour	2.5	2.5	2.5	2.5	294	735	735	735	735
Irrigation (Pumping) fuel	hour/electric	5	5	4.25	4.25	147	735	735	625	625
Harvesting Machine Rent	hour or feddan									
Inputs										
Seeds	Kg	3	3	3	3	490	1,470	1,470	1,470	1,470
Fertilizers										
Urea	Kg	100	100	65	65	8.854	885	885	576	576
Super Triple Phosphate	Kg	100	100	65	65	9.555	956	956	621	621
Pesticides										
Labor										
Seed Sowing	Family labor	1	1	1	1	140	140	140	140	140
	Hired Labor	1	1	1	1	140	140	140	140	140
Irrigation Operation	Family labor	5	5	3.25	3.25	140	700	700	455	455
	Hired Labor									
Fertilizing	Family labor	2	2	1.3	1.3	140	280	280	182	182
	Hired Labor									
Weeding	Family labor	1	1	1	1	140	140	140	140	140
	Hired Labor	2	2	2	2	140	280	280	280	280
Harvesting & Hauling to truck	Family labor	2	2.1	2.6	2.74	140	280	294	364	384
	Hired Labor	8	8.4	10.4	10.96	140	1,120	1,176	1,456	1,534
Total Production Cost							7,861	7,931	7,183	7,281
(B) INCOME										
Main Produce	Ton	19.50	20.48	25.35	26.72	1024	19,968	20,966	25,958	27,356
By Product	Ton									
Total Gross Income							19,968	20,966	25,958	27,356
(C) Net Return (B) - (A)							12,107	13,036	18,775	20,075
(D) Production Cost without Family Labor Cost							6,321	6,377	5,902	5,981
(E) Net Income (B) - (D)							13,647	14,590	20,056	21,375
Net Return Ratio (%)							61%	62%	72%	73%
Net Income Ratio (%)							68%	70%	77%	78%

Table 39 Farm Income per Feddan at Financial Price: Onion (Upper Egypt / Delta)

Item	Unit	Amount Per Feddan				Unit Price (LE/unit)	Value (LE/feddan)			
		W/O Project	W/ project Case A	W/ Project Case B	W/ Project Case C		W/O Project	W/ project Case A	W/ Project Case B	W/ Project Case C
(A) PRODUCTION COST										
Machinery Operation										
Land Preparation (Tractor) Rent	hour	2.5	2.5	2.5	2.5	300	750	750	750	750
Irrigation (Pumping) fuel	hour/electric	12	12	10.2	10.2	150	1,800	1,800	1,530	1,530
Inputs										
Seedlings	Kg	60	60	60	60	50	3,000	3,000	3,000	3,000
Fertilizers										
Urea	Kg	200	200	130	130	9	1,800	1,800	1,170	1,170
Super Triple Phosphate	Kg	100	100	65	65	7.2	720	720	468	468
Pesticides	Litter	6	6	6	6	150	900	900	900	900
Labor										
Land Preparation (Leveling/Furrowing)	Family labor Hired Labor	1 2	1 2	1 2	1 2	140 140	140 280	140 280	140 280	140 280
Planting	Family labor Hired Labor	2 6	2 6	2 6	2 6	140 140	280 840	280 840	280 840	280 840
Irrigation Operation	Family labor Hired Labor	8 4	8 4	5.2 2.6	5.2 2.6	140 140	1,120 560	1,120 560	728 364	728 364
Fertilizing	Family labor Hired Labor	1 1	1 1	0.65 0.65	0.65 0.65	140 140	140 140	140 140	91 91	91 91
Pesticide application	Family labor Hired Labor	2 2	2 2	2 2	2 2	140 140	280 280	280 280	280 280	280 280
Second plow (manual)	Family labor Hired Labor	1 2	1 2	1 2	1 2	140 140	140 280	140 280	140 280	140 280
Harvesting	Family labor Hired Labor	5 10	5.4 10.8	6.5 13	7.00 14.00	140 140	700 1,400	756 1,512	910 1,820	980 1,960
Total Production Cost							15,270	15,438	14,082	14,272
(B) INCOME										
Main Produce	Ton		12.00	12.96	15.6	16.80	36,000	38,880	46,800	50,400
By Product	Ton									
Total Gross Income							36,000	38,880	46,800	50,400
(C) Net Return (B) - (A)							20,730	23,442	32,718	36,128
(D) Production Cost without Family Labor Cost							12,470	12,582	11,493	11,533
(E) Net Income (B) - (D)							23,530	26,298	35,307	38,767
Net Return Ratio (%)							58%	60%	70%	72%
Net Income Ratio (%)							65%	68%	75%	77%

Table 40 Farm Income per Feddan at Economic Price: Onion (Upper Egypt)

Item	Unit	Amount Per Feddan				Unit Price (LE/unit)	Value (LE/feddan)			
		W/O Project	W/ project Case A	W/ Project Case B	W/ Project Case C		W/O Project	W/ project Case A	W/ Project Case B	W/ Project Case C
(A) PRODUCTION COST										
Machinery Operation										
Land Preparation (Tractor) Rent	hour	2.5	2.5	2.5	2.5	294	735	735	735	735
Irrigation (Pumping) fuel	hour/electric	12	12	10.2	10.2	147	1,764	1,764	1,499	1,499
Inputs										
Seedlings	Kg	60	60	60	60	49	2,940	2,940	2,940	2,940
Fertilizers										
Urea	Kg	200	200	130	130	8,537	1,707	1,707	1,110	1,110
Super Triple Phosphate	Kg	100	100	65	65	9,239	924	924	601	601
Pesticides	Litter	6	6	6	6	147	882	882	882	882
Labor										
Land Preparation (Leveling/Furrowing)	Family labor Hired Labor	1 2	1 2	1 2	1 2	140 140	140 280	140 280	140 280	140 280
Planting	Family labor Hired Labor	2 6	2 6	2 6	2 6	140 140	280 840	280 840	280 840	280 840
Irrigation Operation	Family labor Hired Labor	8 4	8 4	5.2 2.6	5.2 2.6	140 140	1,120 560	1,120 560	728 364	728 364
Fertilizing	Family labor Hired Labor	1 1	1 1	0.65 0.65	0.65 0.65	140 140	140 140	140 140	91 91	91 91
Pesticide application	Family labor Hired Labor	2 2	2 2	2 2	2 2	140 140	280 280	280 280	280 280	280 280
Second plow (manual)	Family labor Hired Labor	1 2	1 2	1 2	1 2	140 140	140 280	140 280	140 280	140 280
Harvesting	Family labor Hired Labor	5 10	5.4 10.8	6.5 13	7.00 14.00	140 140	700 1,400	756 1,512	910 1,820	980 1,960
Total Production Cost							15,252	15,420	14,011	14,221
(B) INCOME										
Main Produce	Ton		12.00	12.96	15.6	16.80	2937	35,244	38,064	45,817
By Product	Ton									
Total Gross Income							35,244	38,064	45,817	49,342
(C) Net Return (B) - (A)							19,992	22,643	31,806	35,121
(D) Production Cost without Family Labor Cost							12,452	12,564	11,442	11,582
(E) Net Income (B) - (D)							22,792	25,499	34,375	37,760
Net Return Ratio (%)							57%	59%	69%	71%
Net Income Ratio (%)							65%	67%	75%	77%

Table 41 Farm Income per Feddan at Economic Price: Onion (Delta)

Item	Unit	Amount Per Feddan				Unit Price (LE/unit)	Value (LE/feddan)			
		W/O Project	W/ project Case A	W/ Project Case B	W/ Project Case C		W/O Project	W/ project Case A	W/ Project Case B	W/ Project Case C
(A) PRODUCTION COST										
Machinery Operation										
Land Preparation (Tractor) Rent	hour	2.5	2.5	2.5	2.5	294	735	735	735	735
Irrigation (Pumping) fuel	hour/electric	12	12	10.2	10.2	147	1,764	1,764	1,499	1,499
Inputs										
Seedlings	Kg	60	60	60	60	49	2,940	2,940	2,940	2,940
Fertilizers										
Urea	Kg	200	200	130	130	8,854	1,771	1,771	1,151	1,151
Super Triple Phosphate	Kg	100	100	65	65	9,555	956	956	621	621
Pesticides	Litter	6	6	6	6	147	882	882	882	882
Labor										
Land Preparation (Leveling/Furrowing)	Family labor Hired Labor	1 2	1 2	1 2	1 2	140 140	140 280	140 280	140 280	140 280
Planting	Family labor Hired Labor	2 6	2 6	2 6	2 6	140 140	280 840	280 840	280 840	280 840
Irrigation Operation	Family labor Hired Labor	8 4	8 4	5.2 2.6	5.2 2.6	140 140	1,120 560	1,120 560	728 364	728 364
Fertilizing	Family labor Hired Labor	1 1	1 1	0.65 0.65	0.65 0.65	140 140	140 140	140 140	91 91	91 91
Pesticide application	Family labor Hired Labor	2 2	2 2	2 2	2 2	140 140	280 280	280 280	280 280	280 280
Second plow (manual)	Family labor Hired Labor	1 2	1 2	1 2	1 2	140 140	140 280	140 280	140 280	140 280
Harvesting	Family labor Hired Labor	5 10	5.4 10.8	6.5 13	7.00 14.00	140 140	700 1,400	756 1,512	910 1,820	980 1,960
Total Production Cost							15,347	15,515	14,072	14,282
(B) INCOME										
Main Produce	Ton		12.00	12.96	15.6	16.80	2937	35,244	38,064	45,817
By Product	Ton									
Total Gross Income							35,244	38,064	45,817	49,342
(C) Net Return (B) - (A)							19,897	22,548	31,745	35,059
(D) Production Cost without Family Labor Cost							12,547	12,659	11,503	11,643
(E) Net Income (B) - (D)							22,697	25,404	34,314	37,698
Net Return Ratio (%)							58%	59%	69%	71%
Net Income Ratio (%)							64%	67%	75%	76%

Table 42 Farm Income per Feddan at Financial Price: Tomato (Upper Egypt / Delta)

Item	Unit	Amount Per Feddan				Unit Price (LE/unit)	Value (LE/feddan)				
		W/O Project	W/ project Case A	W/ Project Case B	W/ Project Case C		W/O Project	W/ project Case A	W/ Project Case B	W/ Project Case C	
(A) PRODUCTION COST											
Machinery Operation											
Land Preparation (Tractor) Rent	feddan	2.5	2.5	2.5	2.5	300	750	750	750	750	
Irrigation (Pumping) fuel	hour /electric	12	12	10.2	10.2	150	1,800	1,530	1,530	1,530	
Inputs											
Seedlings	Tray	20	20	20	20	250	5,000	5,000	5,000	5,000	
Fertilizers											
Urea	Kg	400	400	260	260	9	3,600	3,600	2,340	2,340	
Super Triple Phosphate	Kg	100	100	65	65	7.2	720	720	468	468	
Pesticides											
Insecticides	Liter	5	5	5	5	150	750	750	750	750	
Fungicides	Liter	1	1	1	1	150	150	150	150	150	
Labor											
Land Preparation (Leveling/Furrowing)	Family labor	1	1	1	1	140	140	140	140	140	
	Hired Labor	4	4	4	4	140	560	560	560	560	
Planting	Family labor	1	1	1	1	140	140	140	140	140	
	Hired Labor	2	2	2	2	140	280	280	280	280	
Irrigation Operation	Family labor	12	12	7.8	7.8	140	1,680	1,680	1,092	1,092	
	Hired Labor										
Fertilizing	Family labor	3	3	1.95	1.95	140	420	420	273	273	
	Hired Labor										
Pesticide application	Family labor	4	4	4	4	140	560	560	560	560	
	Hired Labor										
Second Plow (manual)	Family labor	1	1	1	1	140	140	140	140	140	
	Hired Labor	2	2	2	2	140	280	280	280	280	
Harvesting	Family labor	5	5.4	6.5	7.0	140	700	756	910	980	
	Hired Labor	10	10.8	13	14.0	140	1,400	1,512	1,820	1,960	
Land Clearing	Family labor										
	Hired Labor	2	2	2	2	140	280	280	280	280	
Total Production Cost							19,350	19,518	17,463	17,673	
(B) INCOME											
Main Produce											
By Product	Ton	14.50	15.66	18.85	20.30	2500	36,250	39,150	47,125	50,750	
Total Gross Income							36,250	39,150	47,125	50,750	
(C) Net Return (B) - (A)							16,900	19,632	29,662	33,077	
(D) Production Cost without Family Labor Cost							15,570	15,682	14,268	14,348	
(E) Net Income (B) - (D)							20,690	23,468	32,917	36,402	
Net Return Ratio (%)								47%	50%	63%	65%
Net Income Ratio (%)								57%	60%	70%	72%

Table 43 Farm Income per Feddan at Economic Price: Tomato (Upper Egypt)

Item	Unit	Amount Per Feddan				Unit Price (LE/unit)	Value (LE/feddan)				
		W/O Project	W/ project Case A	W/ Project Case B	W/ Project Case C		W/O Project	W/ project Case A	W/ Project Case B	W/ Project Case C	
(A) PRODUCTION COST											
Machinery Operation											
Land Preparation (Tractor) Rent	feddan	2.5	2.5	2.5	2.5	294	735	735	735	735	
Irrigation (Pumping) fuel	hour /electric	12	12	10.2	10.2	147	1,764	1,499	1,499	1,499	
Inputs											
Seedlings	Tray	20	20	20	20	245	4,900	4,900	4,900	4,900	
Fertilizers											
Urea	Kg	400	400	260	260	8,537	3,415	3,415	2,220	2,220	
Super Triple Phosphate	Kg	100	100	65	65	9,239	924	924	601	601	
Pesticides											
Insecticides	Liter	5	5	5	5	147	735	735	735	735	
Fungicides	Liter	1	1	1	1	147	147	147	147	147	
Labor											
Land Preparation (Leveling/Furrowing)	Family labor	1	1	1	1	140	140	140	140	140	
	Hired Labor	4	4	4	4	140	560	560	560	560	
Planting	Family labor	1	1	1	1	140	140	140	140	140	
	Hired Labor	2	2	2	2	140	280	280	280	280	
Irrigation Operation	Family labor	12	12	7.8	7.8	140	1,680	1,680	1,092	1,092	
	Hired Labor										
Fertilizing	Family labor	3	3	1.95	1.95	140	420	420	273	273	
	Hired Labor										
Pesticide application	Family labor	4	4	4	4	140	560	560	560	560	
	Hired Labor										
Second Plow (manual)	Family labor	1	1	1	1	140	140	140	140	140	
	Hired Labor	2	2	2	2	140	280	280	280	280	
Harvesting	Family labor	5	5.4	6.5	7.0	140	700	756	910	980	
	Hired Labor	10	10.8	13	14.0	140	1,400	1,512	1,820	1,960	
Land Clearing	Family labor										
	Hired Labor	2	2	2	2	140	280	280	280	280	
Total Production Cost							19,200	19,368	17,312	17,522	
(B) INCOME											
Main Produce											
By Product	Ton	14.50	15.66	18.85	20.30	2448	35,496	38,336	46,145	49,694	
Total Gross Income							35,496	38,336	46,145	49,694	
(C) Net Return (B) - (A)							16,296	18,968	28,833	32,173	
(D) Production Cost without Family Labor Cost							15,420	15,532	14,057	14,197	
(E) Net Income (B) - (D)							20,076	22,804	32,088	35,498	
Net Return Ratio (%)								46%	49%	62%	65%
Net Income Ratio (%)								57%	59%	70%	71%

Table 44 Farm Income per Feddan at Economic Price: Tomato (Delta)

Item	Unit	Amount Per Feddan				Unit Price (LE/unit)	Value (LE/feddan)				
		W/O Project	W/ project Case A	W/ Project Case B	W/ Project Case C		W/O Project	W/ project Case A	W/ Project Case B	W/ Project Case C	
(A) PRODUCTION COST											
Machinery Operation											
Land Preparation (Tractor) Rent	feddan	2.5	2.5	2.5	2.5	294	735	735	735	735	
Irrigation (Pumping) fuel	hour /electric	12	12	10.2	10.2	147	1,764	1,499	1,499	1,499	
Inputs											
Seedlings	Tray	20	20	20	20	245	4,900	4,900	4,900	4,900	
Fertilizers											
Urea	Kg	400	400	260	260	8,554	3,542	3,542	2,302	2,302	
Super Triple Phosphate	Kg	100	100	65	65	9,556	956	956	621	621	
Pesticides											
Insecticides	Liter	5	5	5	5	147	735	735	735	735	
Fungicides	Liter	1	1	1	1	147	147	147	147	147	
Labor											
Land Preparation (Leveling/Furrowing)	Family labor	1	1	1	1	140	140	140	140	140	
	Hired Labor	4	4	4	4	140	560	560	560	560	
Planting	Family labor	1	1	1	1	140	140	140	140	140	
	Hired Labor	2	2	2	2	140	280	280	280	280	
Irrigation Operation	Family labor	12	12	7.8	7.8	140	1,680	1,680	1,092	1,092	
	Hired Labor										
Fertilizing	Family labor	3	3	1.95	1.95	140	420	420	273	273	
	Hired Labor										
Pesticide application	Family labor	4	4	4	4	140	560	560	560	560	
	Hired Labor										
Second Plow (manual)	Family labor	1	1	1	1	140	140	140	140	140	
	Hired Labor	2	2	2	2	140	280	280	280	280	
Harvesting	Family labor	5	5.4	6.5	7.0	140	700	756	910	980	
	Hired Labor	10	10.8	13	14.0	140	1,400	1,512	1,820	1,960	
Land Clearing	Family labor										
	Hired Labor	2	2	2	2	140	280	280	280	280	
Total Production Cost							19,358	19,526	17,415	17,625	
(B) INCOME											
Main Produce											
By Product	Ton	14.50	15.66	18.85	20.30	2448	35,496	38,336	46,145	49,694	
Total Gross Income							35,496	38,336	46,145	49,694	
(C) Net Return (B) - (A)							16,138	18,810	28,730	32,070	
(D) Production Cost without Family Labor Cost							15,578	15,690	14,160	14,300	
(E) Net Income (B) - (D)							19,918	22,646	31,985	35,398	
Net Return Ratio (%)								45%	49%	62%	65%
Net Income Ratio (%)								56%	59%	69%	71%

Table 45 Farm Income per Feddan at Financial Price: Rice (Delta)

Item	Unit	Amount Per Feddan		Unit Price (LE/unit)	Value (LE/feddan)	
		W/O Project	W/ project Case A		W/O Project	W/ project Case A
(A) PRODUCTION COST						
Machinery Operation						
Land Preparation (Tractor) Rent: Plowing	fed	2.5	2.5	300	750	750
Land Preparation (Tractor) Rent: Leveling	fed	3	3	300	900	900
Irrigation (Pumping)	hour	10	10	150	1,500	1,500
Harvesting & Threshing operation	hour	4	4	250	1,000	1,000
Inputs						
Seeds / Seeding	bag (25kg)	2.5	2.5	440	1,100	1,100
Fertilizers						
Urea	Kg	100	100	9	900	900
Super Triple Phosphate	Kg	50	50	7.2	360	360
Chemical for nursery	kg	2	2	15	30	30
Pesticides						
Insecticides	Litter	2	2	150	300	300
Herbicides	Litter	2	2	100	200	200
Labor						
Nursery Preparation	Family labor	Man·Hour or Man·day	2	2	140	280
	Hired Labor	Man·Hour or Man·day	2	2	140	280
Transplanting	Family labor	Man·Hour or Man·day	1	1	140	140
	Hired Labor	Man·Hour or Man·day	10	10	140	1,400
Irrigation Operation	Family labor	Man·Hour or Man·day	6	6	140	840
	Hired Labor	Man·Hour or Man·day				
Fertilizing	Family labor	Man·Hour or Man·day	1	1	140	140
	Hired Labor	Man·Hour or Man·day				
Pesticide application	Family labor	Man·Hour or Man·day	1	1	140	140
	Hired Labor	Man·Hour or Man·day				
Weeding	Family labor	Man·Hour or Man·day	2	2	140	280
	Hired Labor	Man·Hour or Man·day	2	2	140	280
Harvesting	Family labor	Man·Hour or Man·day	1	1.05	140	147
	Hired Labor	Man·Hour or Man·day				
Threshing	Family labor	Man·Hour or Man·day	1	1.05	140	147
	Hired Labor	Man·Hour or Man·day				
Total Production Cost					11,100	11,114
(B) INCOME						
Main Produce	Ton	3.50	3.68	9,000	31,500	33,075
By Product	Qube (20kg)	150.00	154.50	3	450	464
Total Gross Income					31,950	33,539
(C) Net Return (B) - (A)					20,850	22,425
(D) Production Cost without Family Labor Cost					9,000	9,000
(E) Net Income (B) - (D)					22,950	24,539
Net Return Ratio (%)					65%	67%
Net Income Ratio (%)					72%	73%

Table 46 Farm Income per Feddan at Economic Price: Rice (Delta)

Item	Unit	Amount Per Feddan		Unit Price (LE/unit)	Value (LE/feddan)	
		W/O Project	W/ project Case A		W/O Project	W/ project Case A
(A) PRODUCTION COST						
Machinery Operation						
Land Preparation (Tractor) Rent: Plowing	fed	2.5	2.5	294	735	735
Land Preparation (Tractor) Rent: Leveling	fed	3	3	294	882	882
Irrigation (Pumping)	hour	10	10	147	1,470	1,470
Harvesting & Threshing operation	hour	4	4	245	980	980
Inputs						
Seeds / Seeding	bag (25kg)	2.5	2.5	431	1,078	1,078
Fertilizers						
Urea	Kg	100	100	8.854	885	885
Super Triple Phosphate	Kg	50	50	9.555	478	478
Chemical for nursery	kg	2	2	15	30	30
Pesticides						
Insecticides	Litter	2	2	147	294	294
Herbicides	Litter	2	2	98	196	196
Labor						
Nursery Preparation	Family labor	Man·Hour or Man·day	2	2	140	280
	Hired Labor	Man·Hour or Man·day	2	2	140	280
Transplanting	Family labor	Man·Hour or Man·day	1	1	140	140
	Hired Labor	Man·Hour or Man·day	10	10	140	1,400
Irrigation Operation	Family labor	Man·Hour or Man·day	6	6	140	840
	Hired Labor	Man·Hour or Man·day				
Fertilizing	Family labor	Man·Hour or Man·day	1	1	140	140
	Hired Labor	Man·Hour or Man·day				
Pesticide application	Family labor	Man·Hour or Man·day	1	1	140	140
	Hired Labor	Man·Hour or Man·day				
Weeding	Family labor	Man·Hour or Man·day	2	2	140	280
	Hired Labor	Man·Hour or Man·day	2	2	140	280
Harvesting	Family labor	Man·Hour or Man·day	1	1.05	140	147
	Hired Labor	Man·Hour or Man·day				
Threshing	Family labor	Man·Hour or Man·day	1	1.05	140	147
	Hired Labor	Man·Hour or Man·day				
Total Production Cost					11,088	11,102
(B) INCOME						
Main Produce	Ton	3.50	3.68	5,083	17,791	18,680
By Product	Qube (20kg)	150.00	157.50	3	450	473
Total Gross Income					18,241	19,153
(C) Net Return (B) - (A)					7,153	8,051
(D) Production Cost without Family Labor Cost					8,988	8,988
(E) Net Income (B) - (D)					9,253	10,165
Net Return Ratio (%)					39%	42%
Net Income Ratio (%)					51%	53%

VII. SATELLITE IMAGE ANALYSIS

APPENDIX VIII

SATELLITE IMAGE ANALYSIS

VIII.1 Long-Term Trend in Cropped Area by the Irrigation Sections and Governorates	VIII-1
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1.1. Irrigation and Cropped Area by the Irrigation Section (The Analysis by Remote Sensing)

Year	Section1: BY btw Dirout and Sakoula			Section 2: BY btw Sakoula and Lahoon		
	Winter	Summer+Nile	Paddy	Winter	Summer+Nile	Paddy
2000/2001	93,943	90,380	0	79,359	74,223	1,346
2001/2002	96,199	92,660	0	80,609	78,061	1,911
2002/2003	94,433	91,454	0	81,552	77,519	2,430
2003/2004	95,020	96,711	0	79,028	81,472	2,549
2004/2005	96,071	95,192	0	83,470	83,922	1,673
2005/2006	97,279	93,224	0	84,113	79,556	2,639
2006/2007	99,180	101,745	27	84,302	79,537	5,471
2007/2008	98,756	98,110	0	83,738	84,072	3,163
2008/2009	101,485	94,931	0	87,798	81,173	0
2009/2010	99,068	93,188	0	86,710	78,188	0
2010/2011	99,684	91,902	0	85,895	72,413	0
2011/2012	107,432	96,133	0	90,143	80,961	0
2012/2013	101,782	97,116	0	75,492	78,765	0
2013/2014	107,798	98,655	0	91,566	85,921	0
2014/2015	109,022	99,334	13	91,737	83,813	1,009
2015/2016	110,198	98,761	12	92,238	84,267	1,928
2016/2017	113,916	103,393	13	93,085	87,177	1,123
2017/2018	115,298	103,532	0	93,871	87,355	0
2018/2019	115,221	103,819	9	93,177	87,208	1,443
2019/2020	117,705	105,232	12	94,682	88,171	1,210
Year	Section3: BY btw Hassan Wasef			Section 4: BY Lahoon		
	Winter	Summer+Nile	Paddy	Winter	Summer+Nile	Paddy
2000/2001	108,596	102,699	10,448	221,341	208,440	15,207
2001/2002	105,830	105,665	16,905	220,816	212,554	23,105
2002/2003	107,560	102,028	17,849	220,946	206,627	30,191
2003/2004	107,560	103,324	18,765	218,620	209,406	27,128
2004/2005	105,652	104,250	13,735	216,810	209,643	18,857
2005/2006	108,159	101,446	17,175	217,384	207,345	22,244
2006/2007	109,250	103,477	19,153	213,624	207,977	23,176
2007/2008	103,886	103,572	21,300	211,031	202,550	25,763
2008/2009	111,508	105,349	0	220,518	210,088	0
2009/2010	107,835	97,096	0	216,745	196,933	0
2010/2011	107,360	98,197	0	213,419	197,871	0
2011/2012	110,940	95,765	0	217,398	202,800	0
2012/2013	103,369	104,569	0	203,953	201,521	0
2013/2014	111,991	105,960	0	215,588	206,255	0
2014/2015	111,684	105,614	0	214,650	203,961	0
2015/2016	111,519	105,813	0	213,650	202,915	0
2016/2017	111,959	107,691	0	212,861	204,090	0
2017/2018	111,556	108,025	0	212,366	206,833	0
2018/2019	111,067	108,339	0	212,329	207,356	0
2019/2020	113,065	109,317	0	213,700	206,906	0

Unit: feddan

Year	Section5: IB btw Dirout and Maghagha			Section 6: IB btw Maghagha and El Wasta		
	Winter	Summer+Nile	Paddy	Winter	Summer+Nile	Paddy
2000/2001	264,158	262,919	0	217,760	216,500	0
2001/2002	265,799	263,947	0	215,303	217,970	0
2002/2003	261,318	260,702	0	216,291	215,149	0
2003/2004	244,486	261,849	0	203,563	215,866	0
2004/2005	258,079	260,525	0	208,828	215,441	0
2005/2006	259,960	259,181	0	214,334	214,867	0
2006/2007	259,412	259,988	52	207,042	214,406	943
2007/2008	246,192	258,413	0	207,149	209,945	0
2008/2009	255,733	257,204	0	211,844	214,135	0
2009/2010	254,303	253,653	0	212,102	212,952	0
2010/2011	252,430	252,935	0	207,610	207,891	0
2011/2012	258,424	254,023	0	213,324	213,976	0
2012/2013	247,432	255,121	0	205,085	212,226	0
2013/2014	252,464	254,563	0	212,052	212,839	0
2014/2015	252,393	252,596	22	211,532	211,365	440
2015/2016	250,904	252,556	16	209,367	211,372	490
2016/2017	252,457	253,322	16	209,094	210,969	341
2017/2018	252,401	253,499	0	209,102	210,277	0
2018/2019	252,111	253,033	16	208,152	207,428	409
2019/2020	252,739	253,700	18	208,089	209,939	376
Year	Section7: BY&IB Giza			Section 8: Kased		
	Winter	Summer+Nile	Paddy	Winter	Summer+Nile	Paddy
2000/2001	111,930	113,401	0	71,396	77,088	23,631
2001/2002	103,192	111,458	0	72,047	74,923	30,372
2002/2003	109,799	111,609	0	72,618	73,503	30,939
2003/2004	102,460	108,815	0	72,106	75,550	32,642
2004/2005	102,899	112,455	0	66,625	73,173	30,403
2005/2006	107,768	110,238	0	72,080	74,772	35,204
2006/2007	102,862	106,288	63	71,687	75,083	25,802
2007/2008	106,956	110,674	0	71,372	72,259	39,781
2008/2009	104,645	109,242	0	73,387	72,930	23,751
2009/2010	106,280	107,468	0	70,966	72,564	21,112
2010/2011	103,388	107,111	0	71,428	69,838	10,964
2011/2012	93,425	96,833	0	72,549	72,226	27,033
2012/2013	99,808	104,549	0	73,730	73,139	27,358
2013/2014	101,179	102,888	0	69,322	71,736	24,851
2014/2015	100,182	101,489	24	68,228	70,022	2,372
2015/2016	98,680	100,348	38	68,897	69,747	28,516
2016/2017	97,278	99,832	27	70,438	70,291	24,720
2017/2018	97,780	99,317	0	68,019	70,120	8,548
2018/2019	96,000	99,057	19	71,248	70,155	18,088
2019/2020	95,955	99,764	21	69,782	68,547	17,748

Unit: feddan

1.2. Irrigation and Cropped Area by Governorate

(Comparison between the Analysis by Remote Sensing and the Agricultural Statistics of MALR)

Kahr El Shaikh

Unit: feddan

Year	Winter		Summer+Nile		Paddy	
	Stats	Anaslysis	Stats	Anaslysis	Stats	Anaslysis
2000/2001	#N/A	574,881	#N/A	552,643	#N/A	189,319
2001/2002	#N/A	549,520	#N/A	554,323	#N/A	200,994
2002/2003	#N/A	562,961	#N/A	503,610	#N/A	122,887
2003/2004	494,369	571,616	529,557	561,395	256,518	218,147
2004/2005	490,432	523,638	561,166	543,021	255,098	174,080
2005/2006	489,651	579,617	433,606	563,828	271,469	246,816
2006/2007	476,483	579,424	468,671	560,712	293,138	166,477
2007/2008	502,147	575,707	553,638	554,712	358,302	244,073
2008/2009	550,240	568,952	538,363	551,380	324,628	210,164
2009/2010	547,932	577,964	550,477	557,461	276,439	101,810
2010/2011	546,730	577,026	591,750	542,957	296,517	70,717
2011/2012	558,927	579,720	563,581	557,400	290,128	198,394
2012/2013	556,024	580,706	554,507	563,988	291,874	221,792
2013/2014	543,254	577,327	548,287	564,497	276,146	156,968
2014/2015	548,017	570,062	550,525	554,154	248,994	21,789
2015/2016	551,545	576,346	552,206	553,068	268,759	203,292
2016/2017	#N/A	569,972	#N/A	559,199	#N/A	182,628
2017/2018	#N/A	573,078	#N/A	564,214	#N/A	143,127
2018/2019	#N/A	581,802	#N/A	566,784	#N/A	116,774
2019/2020	#N/A	551,584	#N/A	537,862	#N/A	155,678

Gharbia

Unit: feddan

Year	Winter		Summer+Nile		Paddy	
	Stats	Anaslysis	Stats	Anaslysis	Stats	Anaslysis
2000/2001	#N/A	375,939	#N/A	399,746	#N/A	84,429
2001/2002	#N/A	381,014	#N/A	393,617	#N/A	116,802
2002/2003	#N/A	388,471	#N/A	393,302	#N/A	133,209
2003/2004	336,696	383,253	353,471	396,604	166,373	151,671
2004/2005	344,662	362,672	360,339	384,819	161,785	122,419
2005/2006	354,968	378,133	290,409	391,755	181,122	124,165
2006/2007	334,514	379,032	329,972	401,254	192,811	148,238
2007/2008	355,652	377,817	340,924	389,633	178,508	180,056
2008/2009	373,860	382,453	307,835	388,136	126,815	109,668
2009/2010	368,114	369,841	312,760	382,202	154,832	104,371
2010/2011	361,781	367,510	315,381	385,023	123,304	103,000
2011/2012	361,224	378,052	353,254	384,587	147,042	111,790
2012/2013	367,735	382,517	354,991	386,990	153,502	102,474
2013/2014	354,744	363,401	356,634	376,820	144,474	108,312
2014/2015	359,364	350,554	355,057	374,087	108,506	0
2015/2016	366,044	361,420	382,183	371,086	127,903	97,203
2016/2017	#N/A	362,847	#N/A	373,873	#N/A	97,549
2017/2018	#N/A	353,561	#N/A	372,373	#N/A	0
2018/2019	#N/A	371,164	#N/A	373,459	#N/A	75,235
2019/2020	#N/A	356,747	#N/A	367,655	#N/A	61,479

Giza (all)

Unit: feddan

Year	Winter		Summer+Nile		Paddy	
	Stats	Anaslysis	Stats	Anaslysis	Stats	Anaslysis
2000/2001	#N/A	192,654	#N/A	198,748	#N/A	0
2001/2002	#N/A	182,408	#N/A	198,374	#N/A	0
2002/2003	#N/A	194,061	#N/A	201,627	#N/A	0
2003/2004	208,882	181,931	206,553	203,994	0	0
2004/2005	217,881	183,210	221,074	216,127	0	0
2005/2006	212,865	202,092	207,225	213,479	0	0
2006/2007	217,552	190,263	215,710	207,789	0	0
2007/2008	249,759	207,032	202,206	221,219	0	0
2008/2009	217,890	210,043	192,656	220,236	0	0
2009/2010	228,070	217,074	225,162	213,924	0	0
2010/2011	221,601	209,255	206,751	220,381	0	0
2011/2012	245,870	206,385	228,008	211,605	0	0
2012/2013	242,551	212,259	195,579	227,352	0	0
2013/2014	238,752	232,144	207,273	233,294	0	0
2014/2015	282,650	237,672	211,648	229,876	0	0
2015/2016	241,810	238,018	189,342	234,971	0	0
2016/2017	#N/A	243,141	#N/A	244,799	#N/A	0
2017/2018	#N/A	250,449	#N/A	249,882	#N/A	0
2018/2019	#N/A	249,807	#N/A	256,251	#N/A	0
2019/2020	#N/A	253,480	#N/A	261,311	#N/A	0

Giza (Bahariya)

Unit: feddan

Year	Winter		Summer+Nile		Paddy	
	Stats	Anaslysis	Stats	Anaslysis	Stats	Anaslysis
2000/2001	#N/A	12,244	#N/A	12,711	#N/A	0
2001/2002	#N/A	12,318	#N/A	12,346	#N/A	0
2002/2003	#N/A	12,363	#N/A	12,830	#N/A	0
2003/2004	#N/A	12,213	#N/A	13,618	#N/A	0
2004/2005	#N/A	12,980	#N/A	13,344	#N/A	0
2005/2006	#N/A	12,823	#N/A	13,287	#N/A	0
2006/2007	#N/A	13,882	#N/A	14,431	#N/A	0
2007/2008	#N/A	13,270	#N/A	14,179	#N/A	0
2008/2009	#N/A	14,372	#N/A	14,783	#N/A	0
2009/2010	#N/A	16,110	#N/A	14,813	#N/A	0
2010/2011	#N/A	17,781	#N/A	17,847	#N/A	0
2011/2012	#N/A	21,575	#N/A	20,554	#N/A	0
2012/2013	#N/A	22,548	#N/A	22,027	#N/A	0
2013/2014	#N/A	27,257	#N/A	25,660	#N/A	0
2014/2015	#N/A	29,953	#N/A	27,603	#N/A	0
2015/2016	#N/A	30,836	#N/A	28,778	#N/A	0
2016/2017	#N/A	32,228	#N/A	31,624	#N/A	0
2017/2018	#N/A	34,530	#N/A	33,512	#N/A	0
2018/2019	#N/A	36,058	#N/A	35,845	#N/A	0
2019/2020	#N/A	38,441	#N/A	37,737	#N/A	0

Beni Suef

Unit: feddan

Year	Winter		Summer+Nile		Paddy	
	Stats	Anaslysis	Stats	Anaslysis	Stats	Anaslysis
2000/2001	#N/A	287,475	#N/A	283,226	#N/A	0
2001/2002	#N/A	285,765	#N/A	287,602	#N/A	0
2002/2003	#N/A	287,298	#N/A	284,182	#N/A	0
2003/2004	245,045	272,514	199,192	288,321	159	0
2004/2005	252,834	282,107	211,599	290,518	130	0
2005/2006	264,122	290,651	174,746	286,629	1,558	0
2006/2007	251,047	280,049	183,285	287,314	1,283	3,972
2007/2008	274,595	279,537	242,327	287,216	1,494	0
2008/2009	289,904	289,564	229,785	288,226	471	0
2009/2010	296,300	290,735	218,002	284,302	101	0
2010/2011	297,009	285,172	204,515	274,571	285	0
2011/2012	286,364	294,879	244,954	292,076	685	0
2012/2013	297,666	270,104	258,970	286,761	1,382	0
2013/2014	291,588	299,768	257,675	297,706	1,388	0
2014/2015	294,035	301,180	252,112	296,113	664	1,719
2015/2016	307,862	301,175	247,298	298,139	1,628	2,692
2016/2017	#N/A	303,570	#N/A	299,824	#N/A	1,724
2017/2018	#N/A	304,830	#N/A	301,277	#N/A	0
2018/2019	#N/A	303,166	#N/A	301,129	#N/A	2,091
2019/2020	#N/A	304,788	#N/A	302,517	#N/A	1,823

Faiyum

Unit: feddan

Year	Winter		Summer+Nile		Paddy	
	Stats	Anaslysis	Stats	Anaslysis	Stats	Anaslysis
2000/2001	#N/A	341,365	#N/A	322,134	#N/A	27,088
2001/2002	#N/A	337,864	#N/A	329,906	#N/A	42,043
2002/2003	#N/A	340,028	#N/A	319,945	#N/A	50,669
2003/2004	396,271	338,437	335,191	325,310	28,628	48,581
2004/2005	401,997	334,651	322,382	327,389	20,241	34,376
2005/2006	401,776	339,672	314,037	321,450	24,489	42,162
2006/2007	399,671	335,484	314,413	324,528	28,050	45,246
2007/2008	383,381	327,419	339,674	319,241	30,253	50,378
2008/2009	445,211	348,284	346,109	330,357	0	0
2009/2010	422,418	339,722	339,384	306,046	0	0
2010/2011	430,535	334,817	311,354	308,725	0	0
2011/2012	421,267	344,657	335,687	313,747	746	0
2012/2013	421,327	321,339	349,895	320,794	1,453	0
2013/2014	421,577	346,647	368,771	329,879	1,827	0
2014/2015	439,428	345,672	326,321	326,733	391	0
2015/2016	430,520	345,463	348,292	327,241	2,696	0
2016/2017	#N/A	346,135	#N/A	331,969	#N/A	0
2017/2018	#N/A	345,356	#N/A	335,775	#N/A	0
2018/2019	#N/A	344,616	#N/A	337,258	#N/A	0
2019/2020	#N/A	346,808	#N/A	336,587	#N/A	0

Minia

Unit: feddan

Year	Winter		Summer+Nile		Paddy	
	Stats	Anaslysis	Stats	Anaslysis	Stats	Anaslysis
2000/2001	#N/A	486,261	#N/A	479,522	#N/A	0
2001/2002	#N/A	495,203	#N/A	483,403	#N/A	0
2002/2003	#N/A	484,882	#N/A	479,553	#N/A	0
2003/2004	459,694	460,211	443,007	487,665	10	0
2004/2005	450,706	484,731	467,340	485,159	0	0
2005/2006	467,818	487,462	439,257	479,749	36	0
2006/2007	467,594	488,804	436,232	487,763	0	0
2007/2008	457,891	463,057	470,082	486,401	0	0
2008/2009	504,249	489,109	487,197	481,718	0	0
2009/2010	472,771	488,608	445,474	473,262	0	0
2010/2011	470,600	490,950	431,597	469,911	0	0
2011/2012	455,561	509,953	474,276	483,349	0	0
2012/2013	449,317	480,224	450,443	482,364	0	0
2013/2014	465,760	503,724	448,463	492,024	0	0
2014/2015	476,597	511,312	448,588	488,167	0	0
2015/2016	464,814	518,421	443,830	493,639	0	0
2016/2017	#N/A	531,827	#N/A	506,566	#N/A	0
2017/2018	#N/A	540,741	#N/A	516,299	#N/A	0
2018/2019	#N/A	545,646	#N/A	522,727	#N/A	0
2019/2020	#N/A	558,371	#N/A	532,520	#N/A	0

Assuit

Unit: feddan

Year	Winter		Summer+Nile		Paddy	
	Stats	Anaslysis	Stats	Anaslysis	Stats	Anaslysis
2000/2001	#N/A	319,045	#N/A	310,586	#N/A	0
2001/2002	#N/A	322,153	#N/A	315,289	#N/A	0
2002/2003	#N/A	321,233	#N/A	311,836	#N/A	0
2003/2004	323,223	318,467	328,364	313,126	19	0
2004/2005	325,114	325,058	333,211	315,915	0	0
2005/2006	326,670	324,460	317,192	313,855	55	0
2006/2007	333,179	326,449	314,028	311,881	149	0
2007/2008	323,964	322,473	336,438	320,807	194	0
2008/2009	342,028	328,102	341,115	317,348	13	0
2009/2010	344,960	329,541	334,966	316,710	0	0
2010/2011	345,015	330,435	330,302	309,571	0	0
2011/2012	356,513	332,474	336,416	318,520	0	0
2012/2013	358,275	321,591	342,377	320,199	0	0
2013/2014	359,363	336,441	344,956	319,252	0	0
2014/2015	353,372	343,310	348,283	316,967	7	0
2015/2016	352,299	338,540	338,792	320,223	0	0
2016/2017	#N/A	339,861	#N/A	326,929	#N/A	0
2017/2018	#N/A	345,244	#N/A	325,938	#N/A	0
2018/2019	#N/A	349,168	#N/A	328,584	#N/A	0
2019/2020	#N/A	349,012	#N/A	329,571	#N/A	0

2. Planted Area in the Target Sub-Regions

Unit: feddan

Sub-Region Name	Gross Area	Net Area							
		2017-2018		2018-2019		2019-2020		Applied Net Area	
		Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter
Abo Shosha	19,489	17,824	17,976	17,616	17,855	17,639	17,813	17,693	17,881
Aros & Abo Seer	14,462	12,951	13,324	12,881	13,233	12,868	13,433	12,900	13,330
Kased	109,720	93,758	95,739	93,478	95,761	93,000	96,428	93,412	95,976

3. Result of Ground Truth Survey for Satellite Image Analysis

1. Purpose of the Survey

The JICA project team made the satellite image analysis to estimate the actual planted area by irrigation section (hereafter referred to as Section). It is necessary because statistics data published by the Ministry of Agriculture (MOA) is governorate-wise data. The Ministry of Water Resources and Irrigation (MWRI) data seems a gross area that includes non-farmland such as residential areas. The Section-wise data is important to calculate the irrigation efficiency since the discharge volume is measured at each regulator where the starting and ending point of the Sections are located.

Although the accuracy of the satellite image analysis is validated by comparing the MOA statistics (governorate-wise) data, validation from technical aspects is also required to ensure the accuracy of the analysis. Therefore, the ground truth (hereinafter referred to as GT) survey is conducted to confirm if the result of the analysis can identify the farmland in enough accuracy. It should be noted that the analysis identifies if the crops are planted and does not identify the type of crops.

2. Methodology

2.1 Selection of the Target Crops

Target crops are selected as major crops in each sub-region based on the MALR Agricultural Statistics 2018/2019 to secure the accuracy of the analysis. They are chosen from summer crops, winter crops, and permanent crops, covering at least 80% of the total harvested area. Table1 summarizes the harvested area of the major crops in each governorate, showing the selected crops in yellow, and Table2 shows the target crops by sub-region.

Table1. Harvested Area of Major Crops by Governorate during 2018/2019 (ha)

Major Crops		Beni Suef	Fayoum	Gharbia	Kafr El-Shiekh
Winter	Wheat	102,985	185,620	134,963	214,518
	Clover	56,450	56,518	97,028	101,865
	Garlic	12,701	1,743	133	4
	Onion	7,112	11,118	41,584	2,578
	Potato	12,292	0	8,273	925
	Sugar Beet	33,946	35,249	15,792	144,468
	Total	240,106	340,722	337,406	523,330
Summer	Maize	104,199	105,194	22,285	57,134
	Corn	32,029	1,330	25,053	24,652
	Sorghum	4,502	129,652	0	0
	Rice	2,660	3,553	99,588	262,253
	Watermelon	0	0	1,958	39,875
	Potato	771	0	18,539	241
	Dry Beans	0	0	6,876	625
	Cotton	9,058	18,561	12,050	564
	Total	191,846	334,665	325,413	449,362
Permanent	Palm	47	1,159	356	6,146
	Grapes	6,191	1,169	11,675	86
	Mango	452	7,942	208	43
	Olive	101	6,127	0	0
	Orange	2,023	602	11,108	3153
	Total	13,480	23,006	27,516	11,628

Source: MALR Agricultural Statistics 2018/2019

Table2. Target Crops for GT Survey by Sub-Region

Season	Abo Shosha	Aros & Abo Seer	Kased
Winter	<ul style="list-style-type: none"> ✓ Wheat ✓ Clover ✓ Garlic ✓ Potato ✓ Sugar Beet 	<ul style="list-style-type: none"> ✓ Wheat ✓ Clover ✓ Sugar Beet 	<ul style="list-style-type: none"> ✓ Wheat ✓ Clover ✓ Onion ✓ Potato ✓ Sugar Beet
Summer	<ul style="list-style-type: none"> ✓ Maize ✓ Corn ✓ Cotton 	<ul style="list-style-type: none"> ✓ Maize ✓ Sorghum ✓ Cotton 	<ul style="list-style-type: none"> ✓ Rice ✓ Maize ✓ Corn ✓ Watermelon ✓ Potato ✓ Dry Bean ✓ Cotton
Permanent	<ul style="list-style-type: none"> ✓ Grape 	<ul style="list-style-type: none"> ✓ Mango ✓ Olive 	<ul style="list-style-type: none"> ✓ Palm ✓ Grape ✓ Orange
Cover Ratio	87.0%	81.0%	81.6%

Source: JICA Project Team

2.2 Field Survey

JICA Project team searched at least one target farmland for each target crop in each sub-region. The farmland is preferable to be large enough for the survey (at least 20m each) in each subregion. Also, the farmlands nearby the roof or trees are avoided. If there is no suitable farmland inside the sub-region, the JICA Project team extended the survey area to the outside sub-region and found the target land in the same governorate (it must be located in old land).

Table 3 shows the survey items to each farmland. JICA Project team took pictures of farmland and planting crops with the exact coordinate and asked farmers what kind of crop was produced last year and two years ago as reference.

Table3. Survey Items

Items	Description
Date of Survey	Survey date
Name of Crop	Pick one from the target crops
Coordinate	To identify the location of farmland on the map
Picture	Both whole farmland and close-up photo for crops
Crop Age	When it is planted
Name of Crop in the past	If different crop was planted last year and two years ago
Water distribution trouble causing damage of the crop	Yes/No

2.3 Comparison with the result of satellite image analysis

By obtaining the satellite images at the same farmlands where JICA Project team conducted the GT survey, NDVI (Normalized Difference Vegetation Index) is calculated in time series. Satellite images are obtained through the Google Earth Engine (<https://code.earthengine.google.com/>) to extract the maximum NDVI values bi-weekly. The Sentinel-2 level 1C dataset is applied for the study, which is the same satellite image dataset as the image analysis for the calculation of planted area. In addition, to maximize the data availability, the JICA Project Team did not apply a cloud filter since the cloud always makes NDVI values lower, which does not affect the calculation of max NDVI. Table 4 shows the standard number of available satellite images by each period. There are 5 to 7 images available to take maximum NDVI.

Table4. Available Sentinel-2 images in the season 2020/2021

Period			Available Images	Period			Available Images
Oct I	2020/10/1	to 2020/10/15	6	Apr I	2021/4/1	to 2021/4/15	6
Oct II	2020/10/16	to 2020/10/31	6	Apr II	2021/4/16	to 2021/4/30	5
Nov I	2020/11/1	to 2020/11/15	6	May I	2021/5/1	to 2021/5/15	6
Nov II	2020/11/16	to 2020/11/30	6	May II	2021/5/16	to 2021/5/31	7
Dec I	2020/12/1	to 2020/12/15	6	Jun I	2021/6/1	to 2021/6/15	6
Dec II	2020/12/16	to 2020/12/31	6	Jun II	2021/6/16	to 2021/6/30	6
Jan I	2021/1/1	to 2021/1/15	6	Jul I	2021/7/1	to 2021/7/15	6
Jan II	2021/1/16	to 2021/1/31	7	Jul II	2021/7/16	to 2021/7/31	6
Feb I	2021/2/1	to 2021/2/15	5	Aug I	2021/8/1	to 2021/8/15	6
Feb II	2021/2/16	to 2021/2/28	6	Aug II	2021/8/16	to 2021/8/31	7
Mar I	2021/3/1	to 2021/3/15	6	Sep I	2021/9/1	to 2021/9/15	6
Mar II	2021/3/16	to 2021/3/31	6	Sep II	2021/9/16	to 2021/9/30	6

The team validated the accuracy by comparing the maximum value of the time series data above and the threshold value for the analysis (as explained in the report, threshold is set by the Otsu method). The maximum value should be higher than the threshold value. Table 5 shows the threshold value for the satellite image analysis by governorate.

Table5. Threshold NDVI values by Governorate in the season 2018/2019

Sub-Region	Governorate	Winter Crops	Summer Crops	Permanent Crops*
Kased	Kahr El Shaikh	0.357	0.334	0.357
	Gharbia	0.420	0.366	0.420
Abo Shosha	Beni Suef	0.398	0.352	0.398
Aros & Abo Seer	Fayoum	0.398	0.352	0.398

*The threshold of permanent crops are taken the higher value from Winter/Summer crops

Source: JICA Project Team

Figure1 shows the typical NDVI values by land type. There is a clear difference in seasonal maximum NDVI values between planted area (usually more than 0.5) and non-planted area (mostly less than 0.2), which enables binarization by the Otsu method to demarcate planted/non-planted area. Permanent crops have stable NDVI values all the time, whereas seasonal crops have clear peaks in each cropping season. Some of the NDVI values of permanent crops behave similarly to seasonal crops since some of the permanent crops, such as grapes, have a defoliation period during the winter season.

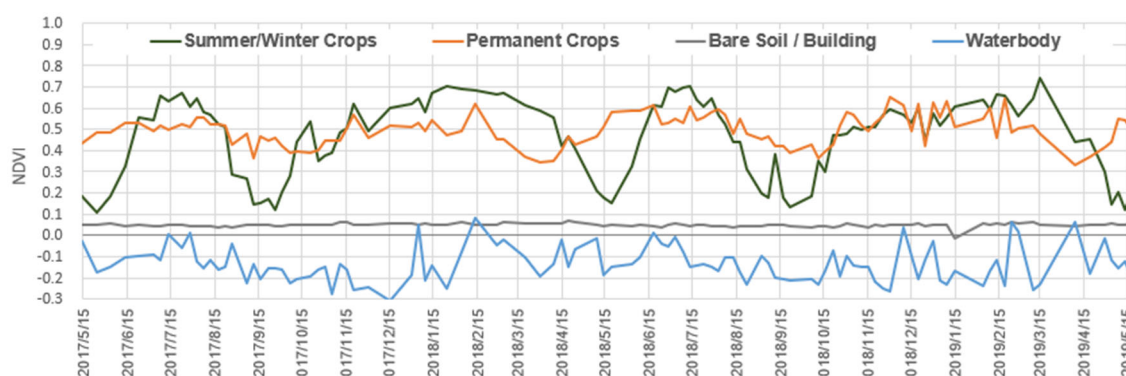


Figure1 Typical NDVI values by land type

3. Result

Forty-one farmlands were surveyed for Ground Truth Check (including the crops planted in the 2019/2020 and 2020/2021 season, the total number of crops confirmed is $41 \times 3 = 123$) during the survey, and **all the winter, summer and permanent crops are identified as planted area** (see the attachment for the detailed result). Onion, Garlic, and Palm tend to show relatively lower NDVI peaks because their leaf area and planting density are smaller than the other crops, which shows 0.37 to 0.48 in some farmlands, whereas Wheat and Clover tend to have higher values with 0.54 to 0.68 at least. The survey found that many farmers intercrop, especially in orchards, which makes peaks in NDVI even though those lands are recognized as permanent crops by MALR statistics.

Table6. Summary of NDVI peak value by Crop and Sub-Region

Crops		Abo Shosha			Aros & Abo Seer			Kased		
		Th	Max NDVI	Verdict	Th	Max NDVI	Verdict	Th	Max NDVI	Verdict
Winter	Wheat	0.40	0.68 - 0.80	OK	0.40	0.68 - 0.81	OK	0.36 ~ 0.42	0.68 - 0.82	OK
	Clover		0.66 - 0.78	OK		0.76 - 0.81	OK		0.54 - 0.82	OK
	Garlic		0.73 - 0.73	OK					0.45 - 0.45	OK
	Potato		0.73 - 0.81	OK					0.79 - 0.79	OK
	Sugar Beet		0.64 - 0.70	OK					0.79 - 0.81	OK
	Onion								0.48 - 0.83	OK
Summer	Maize	0.35	0.47 - 0.47	OK	0.35	0.48 - 0.50	OK	0.33 ~ 0.37	0.49 - 0.51	OK
	Corn		0.39 - 0.50	OK					0.42 - 0.42	OK
	Sorghum					0.52 - 0.52	OK			
	Rice								0.38 - 0.51	OK
	Corn								0.42 - 0.42	OK
	Watermelon								0.39 - 0.39	OK
	Cotton		0.50 - 0.53	OK		0.53 - 0.55	OK		0.45 - 0.53	OK
Permanent	Grapes	0.40	0.51 - 0.75	OK	0.40			0.36 ~ 0.42		
	Mango					0.60 - 0.68	OK			
	Olive					0.61 - 0.72	OK			
	Palm		0.51 - 0.80	OK					0.37 - 0.44	OK
	Laring								0.59 - 0.79	OK

Source: JICA Survey Team

4. Conclusion

The GT survey found that the thresholds set by the Otsu method can identify farmlands appropriately for the crops in all the seasons. However, it found that specifying the type of crops (even determining whether permanent crops or seasonal crops) only by Otsu method is not appropriate because many farmers intercrop, disturbing NDVI values.

In general, planting density tends to become lower in farmlands in new land than those in old land. Therefore, some farmlands in new area, such as olive orchards which planting density is relatively low, might be identified as non-farmland. But all the target sub-regions are located in old land so that it can say that the result of satellite image analysis is accurate enough to grasp the actual planted area by sub-region.

Index: 1

Survey Date: 2022/02/01

Governorate: Gharbia

Sub-Region: Kased (Inside)

Latitude: 30.88024

Longitude: 30.96263

Target Crop

Season	Crop
2021/2022	Wheat
2020/2021	Onion
2019/2020	Onion

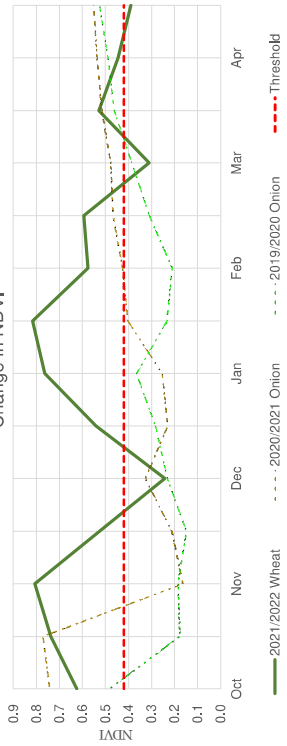
Picture (Age of Crop: 2 - 3 months)



Change in NDVI

Period	2019/2020	2020/2021	2021/2022
Oct I	0.48	0.74	0.62
Oct II	0.18	0.77	0.74
Nov I	0.19	0.16	0.81
Nov II	0.15	0.21	0.53
Dec I	0.23	0.33	0.24
Dec II	0.28	0.23	0.54
Jan I	0.37	0.25	0.76
Jan II	0.23	0.40	0.82
Feb I	0.21	0.43	0.58
Feb II	0.31	0.47	0.59
Mar I	0.39	0.48	0.31
Mar II	0.46	0.52	0.53
Apr I	0.49	0.54	0.44
Apr II	0.53	0.55	0.39
Max	0.53	0.77	0.82
Threshold	0.42		
Verdict	OK	OK	OK

Change in NDVI



Index: 2

Survey Date: 2022/02/01

Governorate: Gharbia

Sub-Region: Kased (Inside)

Latitude: 30.88018

Longitude: 30.96217

Target Crop

Season	Crop
2021/2022	Onion
2020/2021	Clover and Wheat
2019/2020	Onion

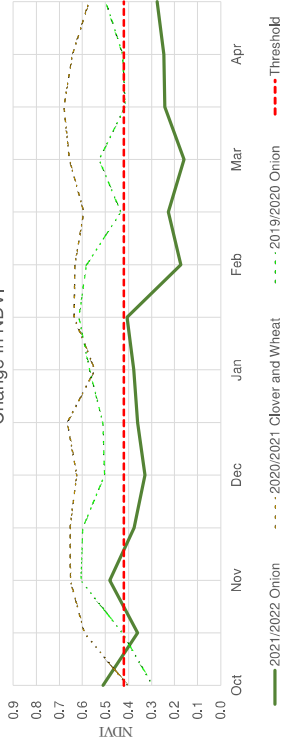
Picture (Age of Crop: 2 - 3 months)



Change in NDVI

Period	2019/2020	2020/2021	2021/2022
Oct I	0.30	0.40	0.51
Oct II	0.43	0.59	0.36
Nov I	0.61	0.65	0.48
Nov II	0.60	0.65	0.38
Dec I	0.50	0.63	0.33
Dec II	0.51	0.67	0.36
Jan I	0.57	0.55	0.38
Jan II	0.62	0.64	0.41
Feb I	0.58	0.63	0.17
Feb II	0.43	0.59	0.23
Mar I	0.53	0.66	0.16
Mar II	0.42	0.68	0.24
Apr I	0.43	0.64	0.25
Apr II	0.50	0.57	0.28
Max	0.62	0.68	0.51
Threshold	0.42		
Verdict	OK	OK	OK

Change in NDVI



Index: 3

Survey Date: 2022/02/01

Governorate: Gharbia

Sub-Region: Kased (Inside)

Latitude: 30.88015

Longitude: 30.96193

Picture (Age of Crop: 2 - 3 months)



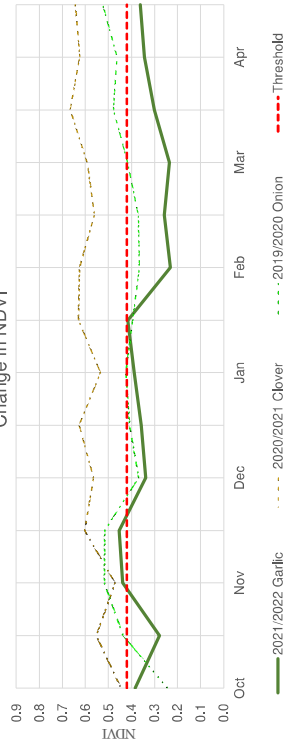
Target Crop

Season	Crop
2021/2022	Garlic
2020/2021	Clover
2019/2020	Onion

Change in NDVI

Period	2019/2020	2020/2021	2021/2022
Oct I	0.24	0.45	0.38
Oct II	0.44	0.55	0.28
Nov I	0.52	0.47	0.44
Nov II	0.52	0.60	0.45
Dec I	0.37	0.57	0.34
Dec II	0.41	0.63	0.36
Jan I	0.43	0.54	0.39
Jan II	0.40	0.63	0.42
Feb I	0.37	0.63	0.23
Feb II	0.37	0.56	0.26
Mar I	0.42	0.59	0.24
Mar II	0.48	0.67	0.30
Apr I	0.46	0.63	0.34
Apr II	0.53	0.64	0.36
Max	0.53	0.67	0.45
Threshold	0.42		
Verdict	OK	OK	OK

Change in NDVI



Index: 4

Survey Date: 2022/02/01

Governorate: Gharbia

Sub-Region: Kased (Inside)

Latitude: 30.8798

Longitude: 30.96011

Picture (Age of Crop: 2 - 3 months)



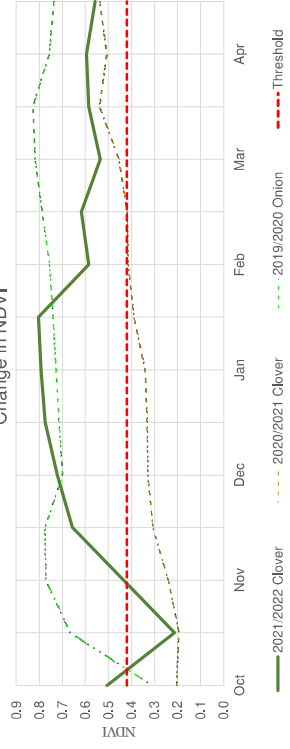
Target Crop

Season	Crop
2021/2022	Clover
2020/2021	Clover
2019/2020	Onion

Change in NDVI

Period	2019/2020	2020/2021	2021/2022
Oct I	0.31	0.20	0.51
Oct II	0.67	0.19	0.21
Nov I	0.77	0.24	0.43
Nov II	0.78	0.31	0.66
Dec I	0.70	0.33	0.72
Dec II	0.72	0.33	0.77
Jan I	0.73	0.34	0.79
Jan II	0.74	0.39	0.80
Feb I	0.76	0.42	0.59
Feb II	0.79	0.42	0.62
Mar I	0.82	0.46	0.53
Mar II	0.83	0.54	0.59
Apr I	0.76	0.51	0.59
Apr II	0.74	0.54	0.56
Max	0.83	0.54	0.80
Threshold	0.42		
Verdict	OK	OK	OK

Change in NDVI



Index: 5

Survey Date: 2022/02/01

Governorate: Gharbia

Sub-Region: Kased (Inside)

Latitude: 30.96512

Longitude: 30.92112

Picture (Age of Crop: more than 1 year)



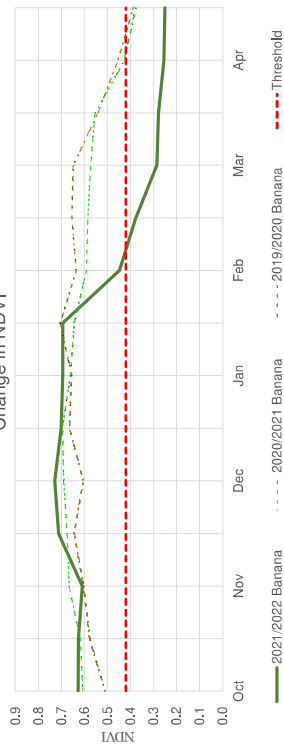
Target Crop

Season	Crop
2021/2022	Banana
2020/2021	Banana
2019/2020	Banana

Change in NDVI

Period	2019/2020	2020/2021	2021/2022
Oct I	0.61	0.51	0.63
Oct II	0.62	0.58	0.62
Nov I	0.67	0.60	0.61
Nov II	0.68	0.65	0.71
Dec I	0.69	0.61	0.73
Dec II	0.70	0.67	0.70
Jan I	0.66	0.66	0.69
Jan II	0.64	0.71	0.69
Feb I	0.59	0.64	0.45
Feb II	0.59	0.66	0.38
Mar I	0.57	0.65	0.28
Mar II	0.55	0.54	0.28
Apr I	0.43	0.46	0.25
Apr II	0.38	0.39	0.25
Max	0.70	0.71	0.73
Threshold	0.42		
Verdict	OK	OK	OK

Change in NDVI



Index: 6

Survey Date: 2022/02/01

Governorate: Gharbia

Sub-Region: Kased (Inside)

Latitude: 30.96276

Longitude: 30.92261

Picture (Age of Crop: 2 - 3 months)



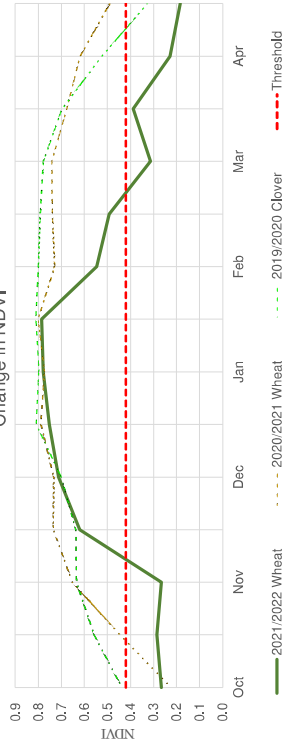
Target Crop

Season	Crop
2021/2022	Wheat
2020/2021	Wheat
2019/2020	Clover

Change in NDVI

Period	2019/2020	2020/2021	2021/2022
Oct I	0.44	0.22	0.26
Oct II	0.56	0.45	0.29
Nov I	0.64	0.65	0.27
Nov II	0.64	0.74	0.62
Dec I	0.70	0.73	0.71
Dec II	0.81	0.79	0.75
Jan I	0.80	0.77	0.78
Jan II	0.81	0.80	0.79
Feb I	0.80	0.73	0.55
Feb II	0.79	0.74	0.49
Mar I	0.78	0.74	0.31
Mar II	0.70	0.68	0.39
Apr I	0.53	0.62	0.23
Apr II	0.33	0.49	0.18
Max	0.81	0.80	0.79
Threshold	0.42		
Verdict	OK	OK	OK

Change in NDVI



Index: 7

Survey Date: 2022/02/01

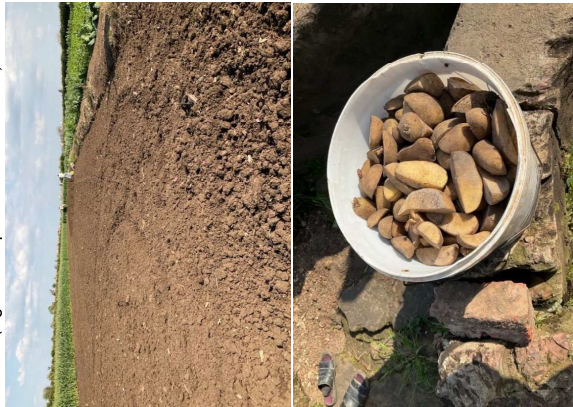
Governorate: Gharbia

Sub-Region: Kased (Inside)

Latitude: 30.9627

Longitude: 30.92266

Picture (Age of Crop: less than 1 month)



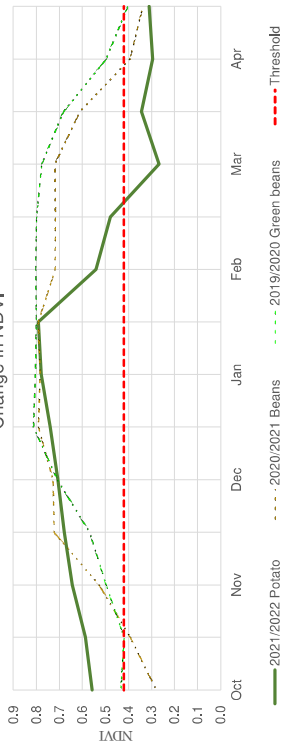
Target Crop

Season	Crop
2021/2022	Potato
2020/2021	Beans
2019/2020	Green beans

Change in NDVI

Period	2019/2020	2020/2021	2021/2022
Oct I	0.43	0.28	0.56
Oct II	0.42	0.39	0.59
Nov I	0.50	0.53	0.64
Nov II	0.57	0.72	0.68
Dec I	0.71	0.73	0.71
Dec II	0.81	0.79	0.74
Jan I	0.81	0.78	0.78
Jan II	0.80	0.79	0.79
Feb I	0.80	0.72	0.54
Feb II	0.80	0.72	0.48
Mar I	0.78	0.72	0.27
Mar II	0.68	0.61	0.34
Apr I	0.50	0.39	0.29
Apr II	0.40	0.34	0.31
Max	0.81	0.79	0.79
Threshold	0.42		
Verdict	OK	OK	OK

Change in NDVI



Index: 8

Survey Date: 2022/02/01

Governorate: Gharbia

Sub-Region: Kased (Inside)

Latitude: 30.9625

Longitude: 30.92277

Picture (Age of Crop: 4 - 5 months)



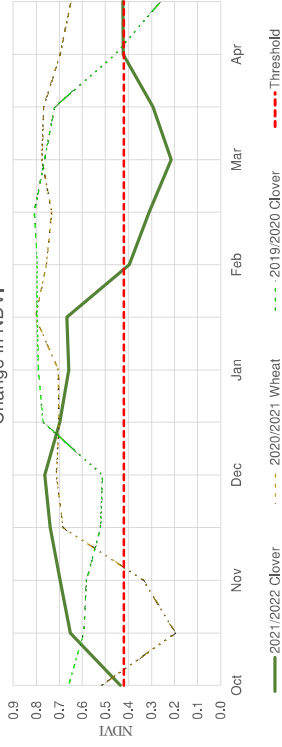
Target Crop

Season	Crop
2021/2022	Clover
2020/2021	Wheat
2019/2020	Clover

Change in NDVI

Period	2019/2020	2020/2021	2021/2022
Oct I	0.66	0.52	0.43
Oct II	0.59	0.20	0.65
Nov I	0.58	0.34	0.70
Nov II	0.52	0.69	0.74
Dec I	0.51	0.71	0.76
Dec II	0.77	0.70	0.70
Jan I	0.79	0.71	0.66
Jan II	0.80	0.81	0.67
Feb I	0.80	0.76	0.40
Feb II	0.81	0.73	0.31
Mar I	0.76	0.78	0.21
Mar II	0.72	0.77	0.29
Apr I	0.46	0.70	0.42
Apr II	0.26	0.65	0.42
Max	0.81	0.81	0.76
Threshold	0.42		
Verdict	OK	OK	OK

Change in NDVI



Index: 9

Survey Date: 2022/02/01

Governorate: Gharbia

Sub-Region: Kased (Inside)

Latitude: 30.96228

Longitude: 30.92292

Target Crop

Season	Crop
2021/2022	Laring
2020/2021	Laring
2019/2020	Laring

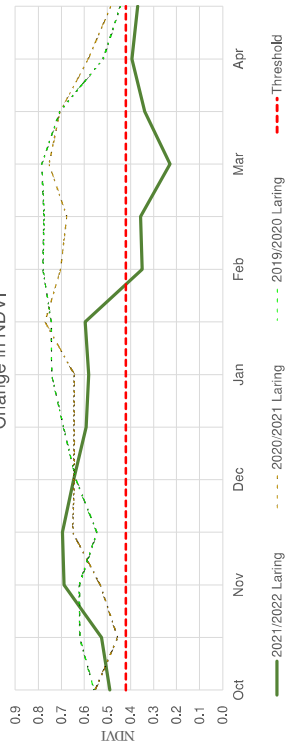
Picture (Age of Crop: more than 1 year)



Change in NDVI

Period	2019/2020	2020/2021	2021/2022
Oct I	0.56	0.55	0.49
Oct II	0.62	0.46	0.53
Nov I	0.62	0.53	0.69
Nov II	0.55	0.65	0.70
Dec I	0.64	0.64	0.65
Dec II	0.69	0.64	0.59
Jan I	0.74	0.64	0.58
Jan II	0.74	0.77	0.60
Feb I	0.78	0.70	0.35
Feb II	0.78	0.66	0.36
Mar I	0.79	0.75	0.23
Mar II	0.71	0.71	0.34
Apr I	0.52	0.58	0.39
Apr II	0.44	0.49	0.37
Max	0.79	0.77	0.70
Threshold	0.42		
Verdict	OK	OK	OK

Change in NDVI



Index: 10

Survey Date: 2022/02/01

Governorate: Gharbia

Sub-Region: Kased (Inside)

Latitude: 30.95889

Longitude: 30.93199

Target Crop

Season	Crop
2021/2022	Laring
2020/2021	Laring
2019/2020	Laring

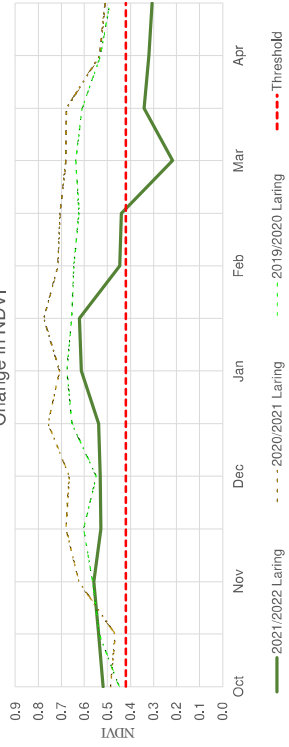
Picture (Age of Crop: more than 1 year)



Change in NDVI

Period	2019/2020	2020/2021	2021/2022
Oct I	0.45	0.49	0.52
Oct II	0.54	0.47	0.54
Nov I	0.57	0.63	0.56
Nov II	0.60	0.68	0.53
Dec I	0.55	0.67	0.53
Dec II	0.65	0.76	0.54
Jan I	0.68	0.71	0.61
Jan II	0.66	0.78	0.62
Feb I	0.65	0.72	0.45
Feb II	0.62	0.71	0.44
Mar I	0.64	0.68	0.22
Mar II	0.61	0.68	0.34
Apr I	0.53	0.53	0.32
Apr II	0.49	0.51	0.31
Max	0.68	0.78	0.62
Threshold	0.42		
Verdict	OK	OK	OK

Change in NDVI



Index: 11

Survey Date: 2022/02/01

Governorate: Gharbia

Sub-Region: Kased (Inside)

Latitude: 30.95623

Longitude: 30.93601

Picture (Age of Crop: more than 1 year)



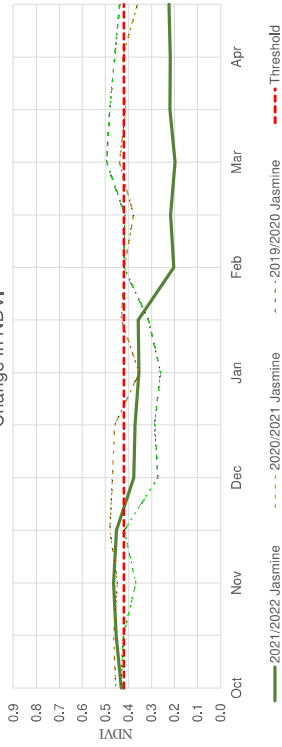
Target Crop

Season	Crop
2021/2022	Jasmine
2020/2021	Jasmine
2019/2020	Jasmine

Change in NDVI

Period	2019/2020	2020/2021	2021/2022
Oct I	0.43	0.46	0.43
Oct II	0.42	0.47	0.45
Nov I	0.37	0.45	0.47
Nov II	0.42	0.48	0.45
Dec I	0.27	0.47	0.38
Dec II	0.29	0.46	0.37
Jan I	0.26	0.35	0.35
Jan II	0.31	0.43	0.36
Feb I	0.42	0.42	0.20
Feb II	0.42	0.38	0.22
Mar I	0.50	0.44	0.20
Mar II	0.48	0.41	0.22
Apr I	0.46	0.43	0.22
Apr II	0.44	0.36	0.22
Max	0.50	0.48	0.47
Threshold	0.42		
Verdict	OK	OK	OK

Change in NDVI



Index: 12

Survey Date: 2022/02/01

Governorate: Gharbia

Sub-Region: Kased (Inside)

Latitude: 30.95768

Longitude: 30.94795

Picture (Age of Crop: 1 - 2 months)



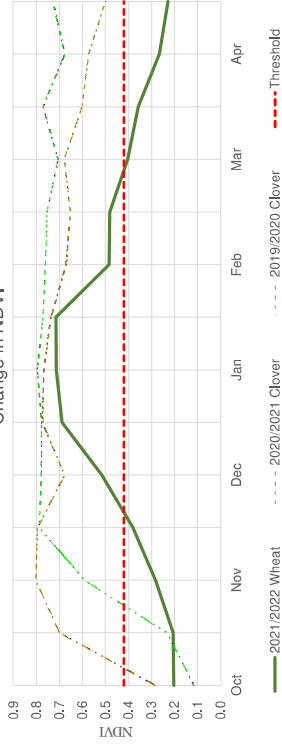
Target Crop

Season	Crop
2021/2022	Wheat
2020/2021	Clover
2019/2020	Clover

Change in NDVI

Period	2019/2020	2020/2021	2021/2022
Oct I	0.12	0.28	0.20
Oct II	0.23	0.70	0.21
Nov I	0.59	0.80	0.28
Nov II	0.79	0.79	0.38
Dec I	0.78	0.68	0.52
Dec II	0.78	0.77	0.69
Jan I	0.80	0.77	0.71
Jan II	0.77	0.74	0.71
Feb I	0.76	0.67	0.48
Feb II	0.75	0.65	0.48
Mar I	0.71	0.68	0.40
Mar II	0.77	0.60	0.36
Apr I	0.68	0.57	0.27
Apr II	0.73	0.50	0.23
Max	0.80	0.80	0.71
Threshold	0.42		
Verdict	OK	OK	OK

Change in NDVI



Index: 13

Survey Date: 2022/02/01

Governorate: Gharbia

Sub-Region: Kased (Inside)

Latitude: 30.95509

Longitude: 30.94825

Picture (Age of Crop: 4 - 5 months)



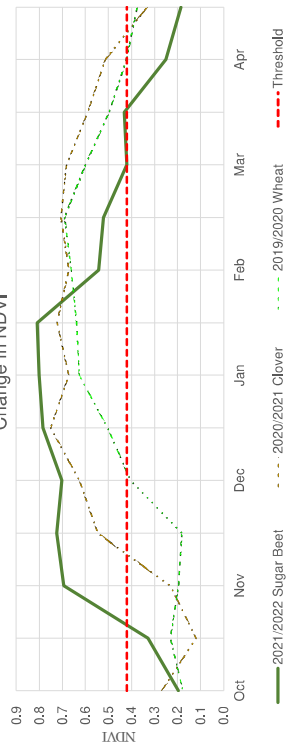
Target Crop

Season	Crop
2021/2022	Sugar Beet
2020/2021	Clover
2019/2020	Wheat

Change in NDVI

Period	2019/2020	2020/2021	2021/2022
Oct I	0.18	0.27	0.20
Oct II	0.23	0.12	0.33
Nov I	0.20	0.23	0.69
Nov II	0.18	0.55	0.72
Dec I	0.40	0.63	0.70
Dec II	0.51	0.75	0.78
Jan I	0.63	0.67	0.80
Jan II	0.64	0.72	0.81
Feb I	0.66	0.67	0.54
Feb II	0.69	0.71	0.52
Mar I	0.60	0.68	0.42
Mar II	0.50	0.59	0.43
Apr I	0.42	0.51	0.25
Apr II	0.38	0.33	0.19
Max	0.69	0.75	0.81
Threshold	0.42		
Verdict	OK	OK	OK

Change in NDVI



Index: 14

Survey Date: 2022/02/01

Governorate: Gharbia

Sub-Region: Kased (Inside)

Latitude: 30.95451

Longitude: 30.94828

Picture (Age of Crop: 1 - 2 months)



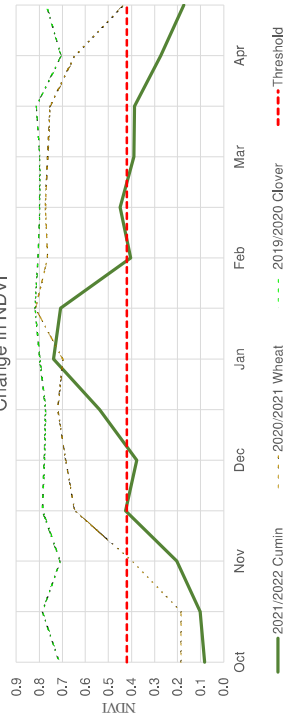
Target Crop

Season	Crop
2021/2022	Cumin
2020/2021	Wheat
2019/2020	Clover

Change in NDVI

Period	2019/2020	2020/2021	2021/2022
Oct I	0.71	0.19	0.08
Oct II	0.79	0.19	0.10
Nov I	0.71	0.40	0.20
Nov II	0.79	0.65	0.43
Dec I	0.78	0.69	0.38
Dec II	0.77	0.72	0.54
Jan I	0.80	0.70	0.74
Jan II	0.82	0.82	0.71
Feb I	0.81	0.76	0.40
Feb II	0.80	0.77	0.45
Mar I	0.80	0.76	0.39
Mar II	0.81	0.75	0.39
Apr I	0.71	0.65	0.27
Apr II	0.77	0.44	0.17
Max	0.82	0.82	0.74
Threshold	0.42		
Verdict	OK	OK	OK

Change in NDVI



Index: 15

Survey Date: 2022/02/01

Governorate: Gharbia

Sub-Region: Kased (Inside)

Latitude: 30.95708

Longitude: 30.94982

Picture (Age of Crop: more than 1 year)



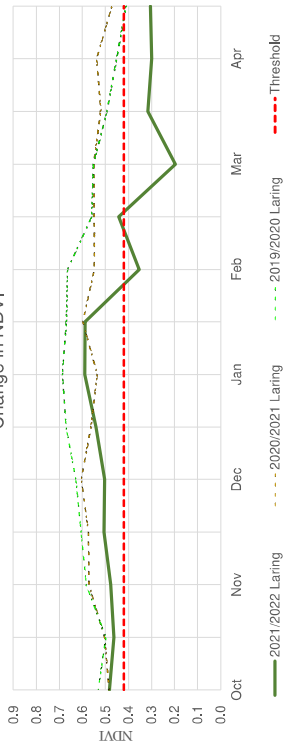
Target Crop

Season	Crop
2021/2022	Laring
2020/2021	Laring
2019/2020	Laring

Change in NDVI

Period	2019/2020	2020/2021	2021/2022
Oct I	0.53	0.49	0.48
Oct II	0.50	0.50	0.46
Nov I	0.58	0.57	0.48
Nov II	0.61	0.57	0.51
Dec I	0.63	0.61	0.50
Dec II	0.67	0.56	0.54
Jan I	0.69	0.54	0.59
Jan II	0.67	0.60	0.59
Feb I	0.67	0.55	0.35
Feb II	0.56	0.55	0.44
Mar I	0.55	0.55	0.20
Mar II	0.49	0.52	0.32
Apr I	0.45	0.54	0.30
Apr II	0.41	0.47	0.31
Max	0.69	0.61	0.59
Threshold	0.42		
Verdict	OK	OK	OK

Change in NDVI



Index: 16

Survey Date: 2022/02/03

Governorate: Kafr El Shiekh

Sub-Region: Kased (Outside)

Latitude: 31.10099

Longitude: 30.98012

Picture (Age of Crop: 1 - 2 months)



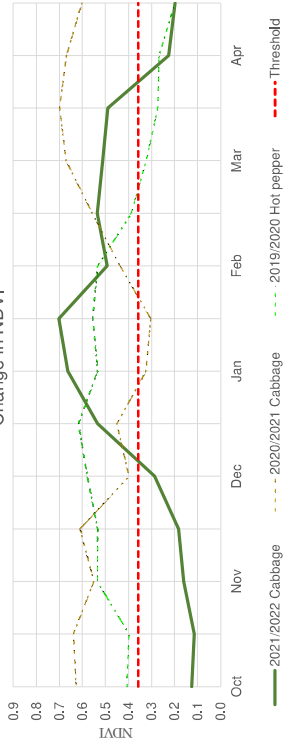
Target Crop

Season	Crop
2021/2022	Cabbage
2020/2021	Cabbage
2019/2020	Hot pepper

Change in NDVI

Period	2019/2020	2020/2021	2021/2022
Oct I	0.41	0.63	0.13
Oct II	0.40	0.64	0.12
Nov I	0.54	0.55	0.16
Nov II	0.53	0.61	0.18
Dec I	0.58	0.40	0.29
Dec II	0.62	0.45	0.53
Jan I	0.53	0.33	0.66
Jan II	0.56	0.30	0.70
Feb I	0.53	0.44	0.49
Feb II	0.39	0.56	0.54
Mar I	0.32	0.67	0.51
Mar II	0.27	0.70	0.49
Apr I	0.27	0.67	0.23
Apr II	0.20	0.60	0.20
Max	0.62	0.70	0.70
Threshold	0.36		
Verdict	OK	OK	OK

Change in NDVI



Index: 17

Survey Date: 2022/02/03

Governorate: Kafir El Shiekh

Sub-Region: Kased (Inside)

Latitude: 30.85429

Longitude: 31.08307

Target Crop

Season	Crop
2021/2022	Grapes
2020/2021	Grapes
2019/2020	Grapes

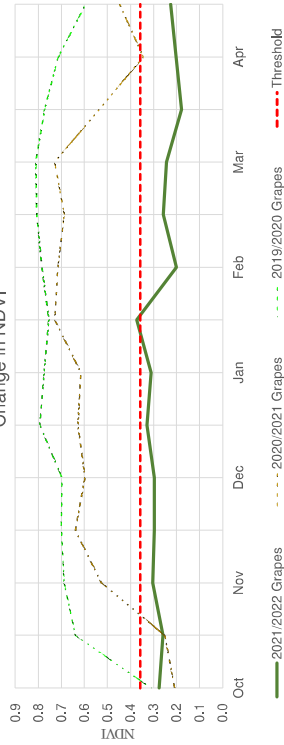
Picture (Age of Crop: more than 1 year)



Change in NDVI

Period	2019/2020	2020/2021	2021/2022
Oct I	0.31	0.21	0.28
Oct II	0.64	0.25	0.26
Nov I	0.69	0.53	0.30
Nov II	0.70	0.64	0.30
Dec I	0.70	0.60	0.30
Dec II	0.79	0.63	0.33
Jan I	0.78	0.62	0.31
Jan II	0.76	0.73	0.37
Feb I	0.78	0.72	0.20
Feb II	0.81	0.69	0.26
Mar I	0.81	0.73	0.24
Mar II	0.77	0.54	0.18
Apr I	0.71	0.34	0.20
Apr II	0.60	0.45	0.23
Max	0.81	0.73	0.37
Threshold	0.36		
Verdict	OK	OK	OK

Change in NDVI



Index: 18

Survey Date: 2022/02/03

Governorate: Kafir El Shiekh

Sub-Region: Kased (Outside)

Latitude: 30.84776

Longitude: 31.14861

Target Crop

Season	Crop
2021/2022	Mango
2020/2021	Mango
2019/2020	Mango

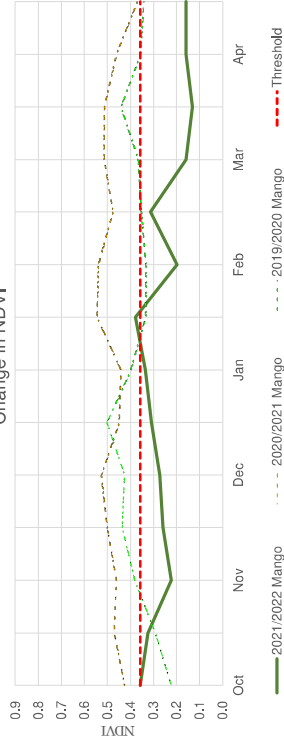
Picture (Age of Crop: more than 1 year)



Change in NDVI

Period	2019/2020	2020/2021	2021/2022
Oct I	0.22	0.43	0.36
Oct II	0.29	0.47	0.32
Nov I	0.38	0.46	0.22
Nov II	0.44	0.50	0.26
Dec I	0.43	0.53	0.27
Dec II	0.50	0.45	0.31
Jan I	0.40	0.44	0.34
Jan II	0.33	0.55	0.38
Feb I	0.33	0.54	0.20
Feb II	0.35	0.48	0.31
Mar I	0.37	0.51	0.16
Mar II	0.44	0.51	0.13
Apr I	0.36	0.46	0.16
Apr II	0.34	0.37	0.16
Max	0.50	0.55	0.38
Threshold	0.36		
Verdict	OK	OK	OK

Change in NDVI



Index: 19

Survey Date: 2022/02/01

Governorate: Gharbia

Sub-Region: Kased (Inside)

Latitude: 30.95767

Longitude: 30.94778

Target Crop

Season	Crop
2021/2022	Onion
2020/2021	Green beans
2019/2020	Beans

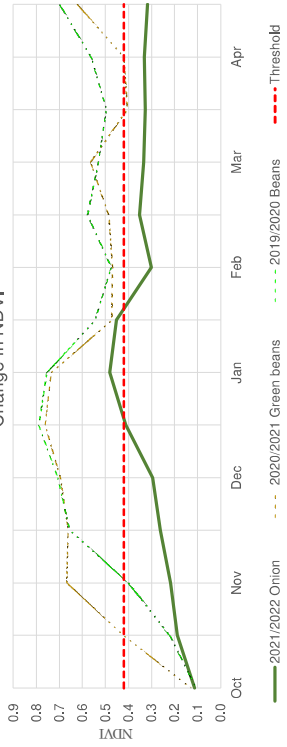
Picture (Age of Crop: 1 - 2 months)



Change in NDVI

Period	2019/2020	2020/2021	2021/2022
Oct I	0.11	0.13	0.11
Oct II	0.22	0.42	0.19
Nov I	0.40	0.67	0.22
Nov II	0.66	0.66	0.26
Dec I	0.71	0.70	0.29
Dec II	0.79	0.76	0.41
Jan I	0.75	0.74	0.48
Jan II	0.55	0.47	0.45
Feb I	0.47	0.47	0.30
Feb II	0.58	0.49	0.35
Mar I	0.53	0.57	0.33
Mar II	0.50	0.41	0.33
Apr I	0.56	0.42	0.33
Apr II	0.70	0.62	0.32
Max	0.79	0.76	0.48
Threshold	0.42		
Verdict	OK	OK	OK

Change in NDVI



Index: 20

Survey Date: 2022/02/03

Governorate: Kafr El Shiekh

Sub-Region: Kased (Inside)

Latitude: 31.10139

Longitude: 30.9796

Target Crop

Season	Crop
2021/2022	Sugar Beet
2020/2021	Clover
2019/2020	Wheat

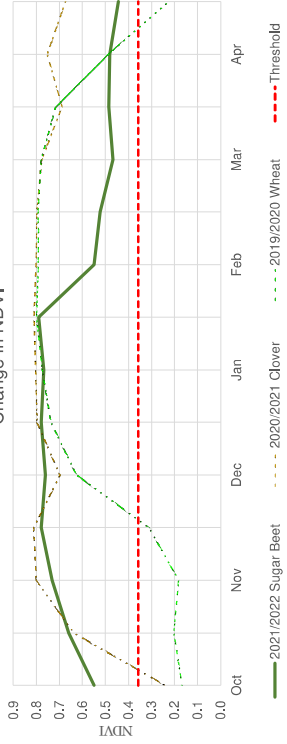
Picture (Age of Crop: 4 - 5 months)



Change in NDVI

Period	2019/2020	2020/2021	2021/2022
Oct I	0.17	0.24	0.55
Oct II	0.20	0.64	0.66
Nov I	0.18	0.80	0.73
Nov II	0.31	0.81	0.78
Dec I	0.63	0.70	0.76
Dec II	0.74	0.80	0.78
Jan I	0.78	0.80	0.77
Jan II	0.80	0.81	0.79
Feb I	0.79	0.80	0.55
Feb II	0.79	0.80	0.52
Mar I	0.78	0.78	0.47
Mar II	0.72	0.69	0.49
Apr I	0.49	0.75	0.48
Apr II	0.23	0.67	0.44
Max	0.80	0.81	0.79
Threshold	0.36		
Verdict	OK	OK	OK

Change in NDVI



Index: 21

Survey Date: 2022/02/05

Governorate: Beni Suef

Sub-Region: Abo Shosha (Outside)

Latitude: 29.15817

Longitude: 31.08628

Target Crop

Season	Crop
2021/2022	Sugarcane
2020/2021	Sugarcane
2019/2020	Sugarcane

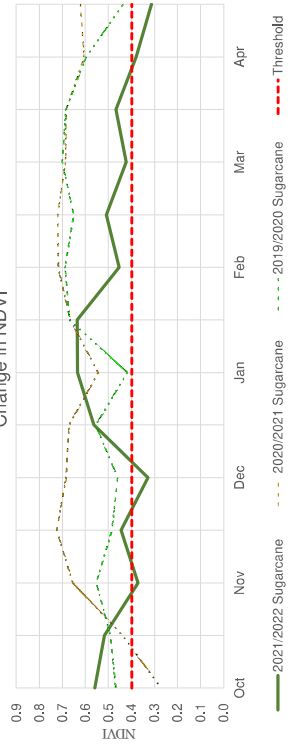
Picture (Age of Crop: more than 1 year)



Change in NDVI

Period	2019/2020	2020/2021	2021/2022
Oct I	0.47	0.27	0.56
Oct II	0.49	0.44	0.52
Nov I	0.55	0.66	0.37
Nov II	0.49	0.72	0.44
Dec I	0.46	0.66	0.33
Dec II	0.56	0.67	0.56
Jan I	0.42	0.55	0.63
Jan II	0.67	0.67	0.64
Feb I	0.69	0.72	0.45
Feb II	0.65	0.72	0.51
Mar I	0.70	0.69	0.42
Mar II	0.68	0.66	0.47
Apr I	0.60	0.61	0.38
Apr II	0.44	0.62	0.31
Max	0.70	0.72	0.64
Threshold	0.40		
Verdict	OK	OK	OK

Change in NDVI



Index: 22

Survey Date: 2022/02/05

Governorate: Beni Suef

Sub-Region: Abo Shosha (Outside)

Latitude: 29.15935

Longitude: 31.08238

Target Crop

Season	Crop
2021/2022	Palm
2020/2021	Palm
2019/2020	Palm

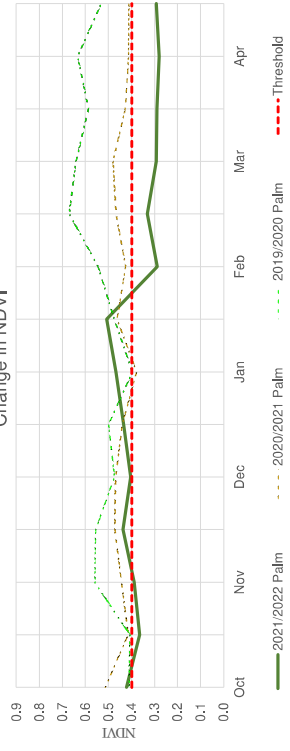
Picture (Age of Crop: more than 1 year)



Change in NDVI

Period	2019/2020	2020/2021	2021/2022
Oct I	0.41	0.52	0.42
Oct II	0.41	0.41	0.37
Nov I	0.56	0.44	0.39
Nov II	0.56	0.47	0.44
Dec I	0.47	0.47	0.40
Dec II	0.50	0.44	0.43
Jan I	0.40	0.38	0.47
Jan II	0.47	0.46	0.51
Feb I	0.55	0.43	0.29
Feb II	0.67	0.47	0.33
Mar I	0.64	0.48	0.29
Mar II	0.59	0.43	0.29
Apr I	0.63	0.41	0.28
Apr II	0.53	0.41	0.29
Max	0.67	0.52	0.51
Threshold	0.40		
Verdict	OK	OK	OK

Change in NDVI



Index: 23

Survey Date: 2022/02/05

Governorate: Beni Suef

Sub-Region: Abo Shosha (Outside)

Latitude: 29.15854

Longitude: 31.08545

Picture (Age of Crop: 4 - 5 months)



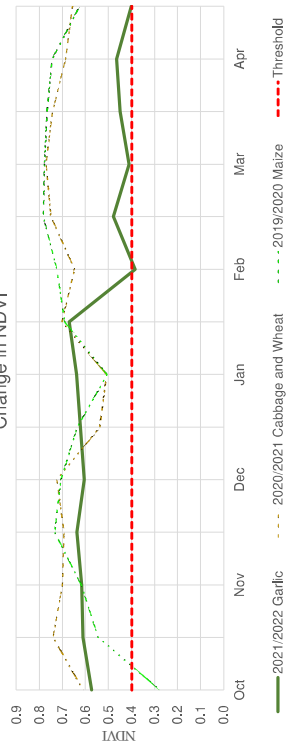
Target Crop

Season	Crop
2021/2022	Garlic
2020/2021	Cabbage and Wheat
2019/2020	Maize

Change in NDVI

Period	2019/2020	2020/2021	2021/2022
Oct I	0.28	0.61	0.57
Oct II	0.54	0.74	0.61
Nov I	0.62	0.70	0.62
Nov II	0.73	0.69	0.64
Dec I	0.71	0.73	0.60
Dec II	0.64	0.54	0.62
Jan I	0.51	0.51	0.64
Jan II	0.69	0.70	0.67
Feb I	0.73	0.65	0.38
Feb II	0.78	0.75	0.48
Mar I	0.78	0.77	0.41
Mar II	0.77	0.74	0.45
Apr I	0.75	0.69	0.46
Apr II	0.63	0.66	0.40
Max	0.78	0.77	0.67
Threshold	0.40		
Verdict	OK	OK	OK

Change in NDVI



Index: 24

Survey Date: 2022/02/05

Governorate: Beni Suef

Sub-Region: Abo Shosha (Inside)

Latitude: 28.83608

Longitude: 30.8913

Picture (Age of Crop: 2 - 3 months)



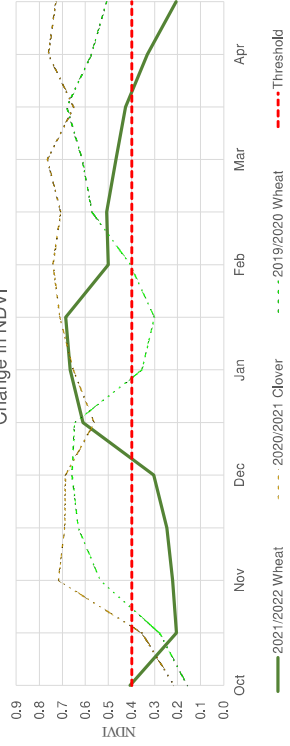
Target Crop

Season	Crop
2021/2022	Wheat
2020/2021	Clover
2019/2020	Wheat

Change in NDVI

Period	2019/2020	2020/2021	2021/2022
Oct I	0.16	0.22	0.41
Oct II	0.28	0.36	0.21
Nov I	0.54	0.72	0.22
Nov II	0.63	0.69	0.25
Dec I	0.66	0.69	0.30
Dec II	0.65	0.56	0.61
Jan I	0.36	0.65	0.67
Jan II	0.30	0.71	0.68
Feb I	0.41	0.74	0.50
Feb II	0.57	0.71	0.51
Mar I	0.61	0.77	0.47
Mar II	0.68	0.65	0.43
Apr I	0.57	0.76	0.33
Apr II	0.51	0.73	0.21
Max	0.68	0.77	0.68
Threshold	0.40		
Verdict	OK	OK	OK

Change in NDVI



Index: 25

Survey Date: 2022/02/05

Governorate: Beni Suef

Sub-Region: Abo Shosha (Inside)

Latitude: 28.83585

Longitude: 30.89121

Target Crop

Season	Crop
2021/2022	Garlic
2020/2021	None
2019/2020	Beans

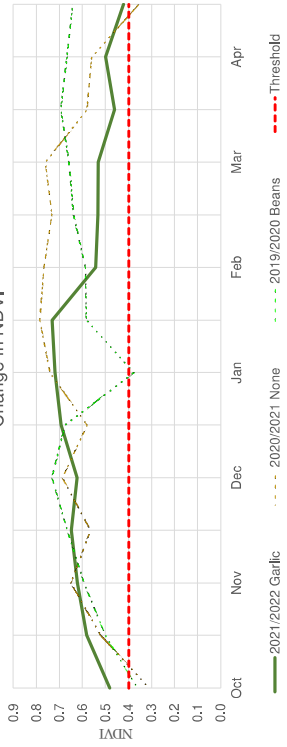
Picture (Age of Crop: 3 - 4 months)



Change in NDVI

Period	2019/2020	2020/2021	2021/2022
Oct I	0.36	0.31	0.48
Oct II	0.50	0.52	0.58
Nov I	0.59	0.65	0.62
Nov II	0.67	0.57	0.65
Dec I	0.73	0.69	0.62
Dec II	0.68	0.56	0.69
Jan I	0.38	0.74	0.72
Jan II	0.58	0.79	0.73
Feb I	0.59	0.77	0.54
Feb II	0.64	0.73	0.53
Mar I	0.66	0.76	0.53
Mar II	0.69	0.58	0.46
Apr I	0.67	0.56	0.50
Apr II	0.64	0.36	0.42
Max	0.73	0.79	0.73
Threshold	0.40		
Verdict	OK	OK	OK

Change in NDVI



Index: 26

Survey Date: 2022/02/05

Governorate: Beni Suef

Sub-Region: Abo Shosha (Inside)

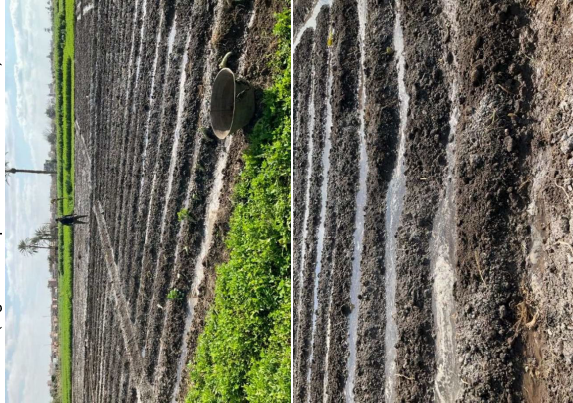
Latitude: 28.83581

Longitude: 30.89137

Target Crop

Season	Crop
2021/2022	Potato
2020/2021	Clover
2019/2020	Wheat

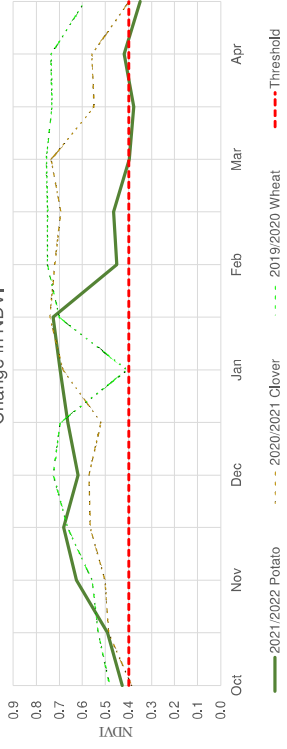
Picture (Age of Crop: less than 1 month)



Change in NDVI

Period	2019/2020	2020/2021	2021/2022
Oct I	0.48	0.39	0.43
Oct II	0.53	0.49	0.49
Nov I	0.56	0.50	0.62
Nov II	0.66	0.57	0.68
Dec I	0.73	0.57	0.62
Dec II	0.70	0.52	0.66
Jan I	0.41	0.69	0.70
Jan II	0.70	0.74	0.73
Feb I	0.75	0.72	0.45
Feb II	0.75	0.69	0.46
Mar I	0.76	0.74	0.40
Mar II	0.73	0.55	0.38
Apr I	0.74	0.56	0.42
Apr II	0.59	0.40	0.35
Max	0.76	0.74	0.73
Threshold	0.40		
Verdict	OK	OK	OK

Change in NDVI



Index: 27

Survey Date: 2022/02/05

Governorate: Beni Suef

Sub-Region: Abo Shosha (Inside)

Latitude: 28.83794

Longitude: 30.88631

Picture (Age of Crop: more than 1 year)



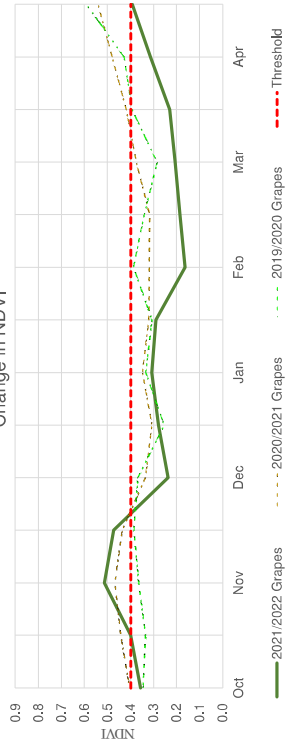
Target Crop

Season	Crop
2021/2022	Grapes
2020/2021	Grapes
2019/2020	Grapes

Change in NDVI

Period	2019/2020	2020/2021	2021/2022
Oct I	0.35	0.41	0.35
Oct II	0.34	0.44	0.40
Nov I	0.37	0.47	0.51
Nov II	0.39	0.44	0.47
Dec I	0.37	0.34	0.24
Dec II	0.25	0.31	0.28
Jan I	0.33	0.35	0.31
Jan II	0.31	0.32	0.29
Feb I	0.39	0.32	0.16
Feb II	0.34	0.32	0.18
Mar I	0.28	0.38	0.21
Mar II	0.39	0.42	0.23
Apr I	0.43	0.48	0.31
Apr II	0.59	0.54	0.39
Max	0.59	0.54	0.51
Threshold	0.40		
Verdict	OK	OK	OK

Change in NDVI



Index: 28

Survey Date: 2022/02/05

Governorate: Beni Suef

Sub-Region: Abo Shosha (Inside)

Latitude: 28.84092

Longitude: 30.84947

Picture (Age of Crop: 4 - 5 months)



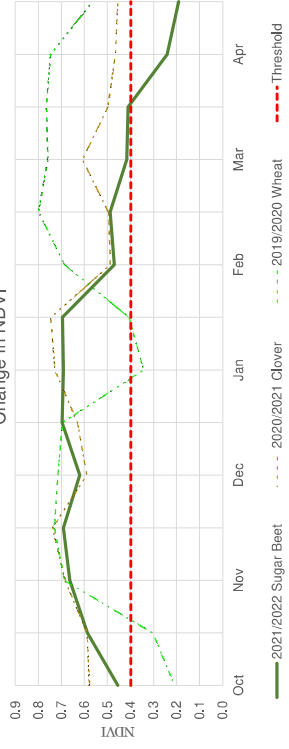
Target Crop

Season	Crop
2021/2022	Sugar Beet
2020/2021	Clover
2019/2020	Wheat

Change in NDVI

Period	2019/2020	2020/2021	2021/2022
Oct I	0.21	0.58	0.46
Oct II	0.30	0.59	0.59
Nov I	0.69	0.68	0.66
Nov II	0.73	0.74	0.69
Dec I	0.72	0.59	0.62
Dec II	0.70	0.63	0.70
Jan I	0.34	0.73	0.69
Jan II	0.41	0.75	0.70
Feb I	0.69	0.49	0.47
Feb II	0.80	0.50	0.49
Mar I	0.76	0.61	0.42
Mar II	0.77	0.50	0.41
Apr I	0.75	0.47	0.24
Apr II	0.57	0.46	0.19
Max	0.80	0.75	0.70
Threshold	0.40		
Verdict	OK	OK	OK

Change in NDVI



Index: 29

Survey Date: 2022/02/05

Governorate: Beni Suef

Sub-Region: Abo Shosha (Inside)

Latitude: 28.84092

Longitude: 30.84963

Picture (Age of Crop: 2 - 3 months)



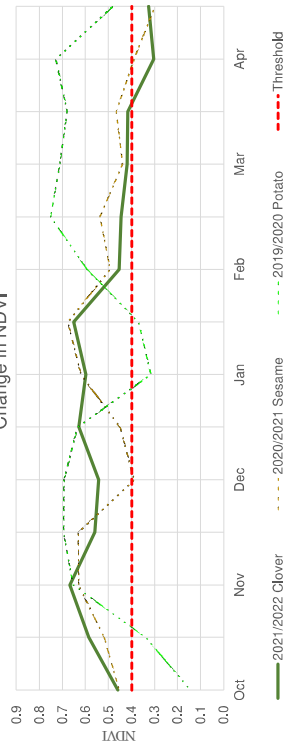
Target Crop

Season	Crop
2021/2022	Clover
2020/2021	Sesame
2019/2020	Potato

Change in NDVI

Period	2019/2020	2020/2021	2021/2022
Oct I	0.14	0.45	0.46
Oct II	0.34	0.52	0.59
Nov I	0.65	0.63	0.67
Nov II	0.70	0.63	0.56
Dec I	0.69	0.39	0.54
Dec II	0.64	0.45	0.63
Jan I	0.32	0.62	0.60
Jan II	0.37	0.66	0.65
Feb I	0.59	0.49	0.45
Feb II	0.75	0.54	0.44
Mar I	0.71	0.44	0.42
Mar II	0.68	0.47	0.42
Apr I	0.73	0.39	0.30
Apr II	0.48	0.30	0.33
Max	0.75	0.66	0.67
Threshold	0.40		
Verdict	OK	OK	OK

Change in NDVI



Index: 30

Survey Date: 2022/02/05

Governorate: Beni Suef

Sub-Region: Abo Shosha (Inside)

Latitude: 28.84094

Longitude: 30.84981

Picture (Age of Crop: 2 - 3 months)



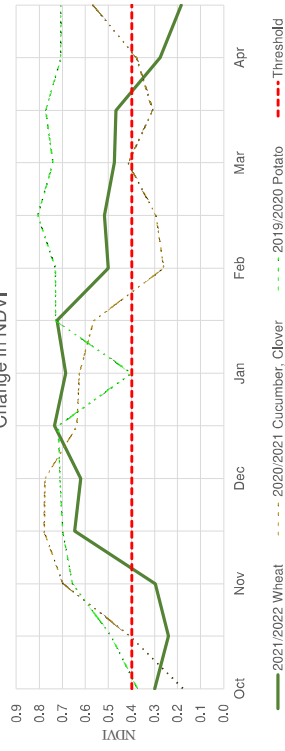
Target Crop

Season	Crop
2021/2022	Wheat
2020/2021	Cucumber, Clover
2019/2020	Potato

Change in NDVI

Period	2019/2020	2020/2021	2021/2022
Oct I	0.37	0.18	0.30
Oct II	0.49	0.41	0.24
Nov I	0.66	0.70	0.30
Nov II	0.70	0.78	0.65
Dec I	0.71	0.78	0.62
Dec II	0.72	0.64	0.73
Jan I	0.40	0.63	0.69
Jan II	0.73	0.56	0.72
Feb I	0.73	0.26	0.50
Feb II	0.81	0.29	0.52
Mar I	0.74	0.42	0.47
Mar II	0.77	0.31	0.47
Apr I	0.71	0.38	0.28
Apr II	0.71	0.57	0.18
Max	0.81	0.78	0.73
Threshold	0.40		
Verdict	OK	OK	OK

Change in NDVI



Index: 31

Survey Date: 2022/02/05

Governorate: Beni Suef

Sub-Region: Abo Shosha (Inside)

Latitude: 28.84093

Longitude: 30.84999

Target Crop

Season	Crop
2021/2022	Pear
2020/2021	Pear
2019/2020	Pear

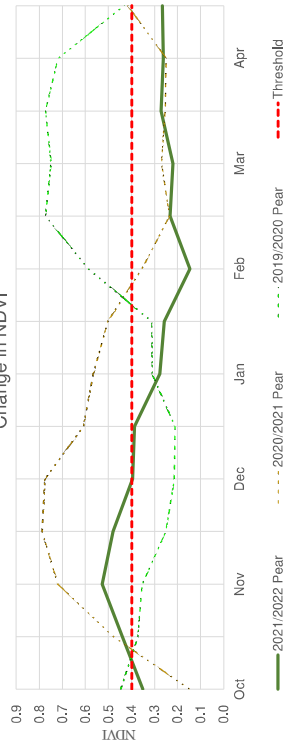
Picture (Age of Crop: more than 1 year)



Change in NDVI

Period	2019/2020	2020/2021	2021/2022
Oct I	0.45	0.15	0.35
Oct II	0.37	0.48	0.44
Nov I	0.35	0.72	0.53
Nov II	0.25	0.79	0.48
Dec I	0.21	0.78	0.39
Dec II	0.21	0.61	0.39
Jan I	0.31	0.57	0.28
Jan II	0.31	0.50	0.26
Feb I	0.59	0.36	0.15
Feb II	0.77	0.24	0.23
Mar I	0.75	0.27	0.22
Mar II	0.77	0.25	0.27
Apr I	0.72	0.25	0.26
Apr II	0.43	0.42	0.27
Max	0.77	0.79	0.53
Threshold	0.40		
Verdict	OK	OK	OK

Change in NDVI



Index: 32

Survey Date: 2022/02/05

Governorate: Beni Suef

Sub-Region: Abo Shosha (Inside)

Latitude: 28.84091

Longitude: 30.85062

Target Crop

Season	Crop
2021/2022	Grapes
2020/2021	Grapes
2019/2020	Grapes

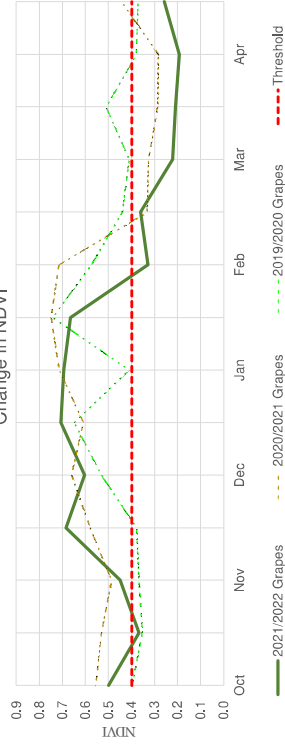
Picture (Age of Crop: more than 1 year)



Change in NDVI

Period	2019/2020	2020/2021	2021/2022
Oct I	0.40	0.56	0.50
Oct II	0.35	0.53	0.37
Nov I	0.37	0.49	0.45
Nov II	0.38	0.58	0.68
Dec I	0.53	0.66	0.60
Dec II	0.65	0.61	0.71
Jan I	0.41	0.71	0.69
Jan II	0.74	0.75	0.67
Feb I	0.57	0.72	0.33
Feb II	0.44	0.33	0.36
Mar I	0.41	0.33	0.22
Mar II	0.51	0.29	0.21
Apr I	0.38	0.28	0.19
Apr II	0.37	0.44	0.26
Max	0.74	0.75	0.71
Threshold	0.40		
Verdict	OK	OK	OK

Change in NDVI



Index: 33

Survey Date: 2022/02/05

Governorate: Beni Suef

Sub-Region: Abo Shosha (Inside)

Latitude: 28.8409

Longitude: 30.84666

Target Crop

Season	Crop
2021/2022	Grapes
2020/2021	Grapes
2019/2020	Grapes

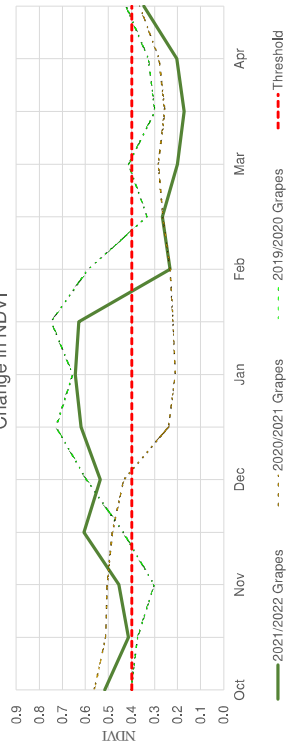
Picture (Age of Crop: more than 1 year)



Change in NDVI

Period	2019/2020	2020/2021	2021/2022
Oct I	0.40	0.56	0.52
Oct II	0.37	0.51	0.41
Nov I	0.30	0.51	0.46
Nov II	0.44	0.48	0.61
Dec I	0.60	0.43	0.54
Dec II	0.73	0.24	0.62
Jan I	0.66	0.21	0.64
Jan II	0.75	0.22	0.63
Feb I	0.59	0.23	0.23
Feb II	0.33	0.27	0.27
Mar I	0.41	0.28	0.20
Mar II	0.30	0.26	0.17
Apr I	0.33	0.28	0.20
Apr II	0.42	0.36	0.35
Max	0.75	0.56	0.64
Threshold	0.40		
Verdict	OK	OK	OK

Change in NDVI



Index: 34

Survey Date: 2022/02/05

Governorate: Beni Suef

Sub-Region: Abo Shosha (Inside)

Latitude: 28.84584

Longitude: 30.80907

Target Crop

Season	Crop
2021/2022	Palm
2020/2021	Palm
2019/2020	Palm

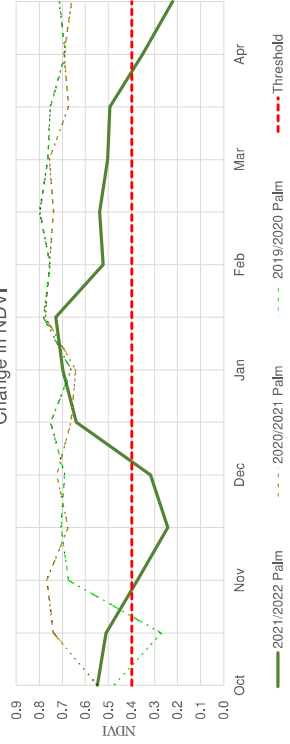
Picture (Age of Crop: more than 1 year)



Change in NDVI

Period	2019/2020	2020/2021	2021/2022
Oct I	0.48	0.55	0.55
Oct II	0.27	0.74	0.51
Nov I	0.67	0.77	0.37
Nov II	0.71	0.68	0.24
Dec I	0.69	0.73	0.32
Dec II	0.75	0.66	0.64
Jan I	0.66	0.64	0.70
Jan II	0.78	0.77	0.73
Feb I	0.75	0.76	0.52
Feb II	0.80	0.74	0.54
Mar I	0.76	0.76	0.50
Mar II	0.75	0.67	0.49
Apr I	0.69	0.69	0.35
Apr II	0.71	0.66	0.22
Max	0.80	0.77	0.73
Threshold	0.40		
Verdict	OK	OK	OK

Change in NDVI



Index: 35

Survey Date: 2022/02/05

Governorate: Beni Suef

Sub-Region: Abo Shosha (Inside)

Latitude: 28.87214

Longitude: 30.81182

Picture (Age of Crop: 2 - 3 months)



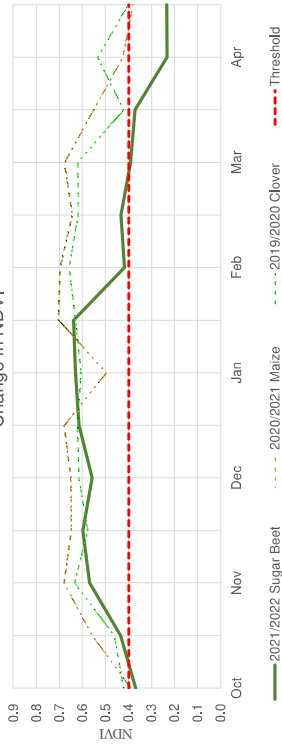
Target Crop

Season	Crop
2021/2022	Sugar Beet
2020/2021	Maize
2019/2020	Clover

Change in NDVI

Period	2019/2020	2020/2021	2021/2022
Oct I	0.42	0.39	0.37
Oct II	0.46	0.56	0.43
Nov I	0.63	0.68	0.57
Nov II	0.58	0.65	0.60
Dec I	0.62	0.65	0.56
Dec II	0.62	0.66	0.61
Jan I	0.61	0.50	0.63
Jan II	0.63	0.70	0.64
Feb I	0.66	0.70	0.42
Feb II	0.62	0.64	0.43
Mar I	0.62	0.68	0.39
Mar II	0.42	0.55	0.37
Apr I	0.53	0.42	0.23
Apr II	0.40	0.38	0.23
Max	0.66	0.70	0.64
Threshold	0.40		
Verdict	OK	OK	OK

Change in NDVI



Index: 36

Survey Date: 2022/02/07

Governorate: Fayoum

Sub-Region: Aros & Abo Seer (Inside)

Latitude: 29.26371

Longitude: 30.82643

Picture (Age of Crop: 3 - 4 months)



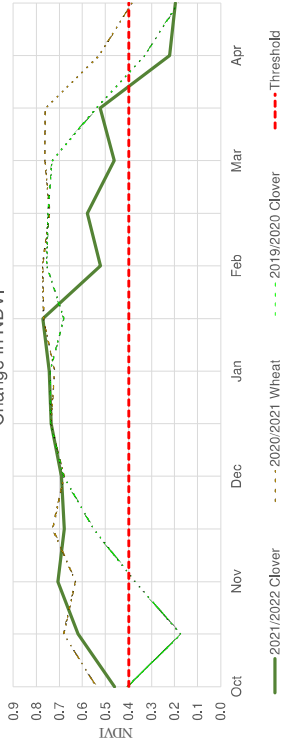
Target Crop

Season	Crop
2021/2022	Clover
2020/2021	Wheat
2019/2020	Clover

Change in NDVI

Period	2019/2020	2020/2021	2021/2022
Oct I	0.41	0.54	0.46
Oct II	0.17	0.68	0.62
Nov I	0.37	0.63	0.71
Nov II	0.55	0.73	0.68
Dec I	0.68	0.68	0.69
Dec II	0.74	0.74	0.74
Jan I	0.74	0.72	0.74
Jan II	0.68	0.77	0.77
Feb I	0.76	0.77	0.52
Feb II	0.75	0.74	0.58
Mar I	0.73	0.76	0.46
Mar II	0.54	0.76	0.52
Apr I	0.33	0.53	0.22
Apr II	0.19	0.39	0.20
Max	0.76	0.77	0.77
Threshold	0.40		
Verdict	OK	OK	OK

Change in NDVI



Index: 37

Survey Date: 2022/02/07

Governorate: Fayoum

Sub-Region: Aros & Abo Seer (Inside)

Latitude: 29.26341

Longitude: 30.82641

Target Crop

Season	Crop
2021/2022	Sugar Beet
2020/2021	Wheat
2019/2020	Clover

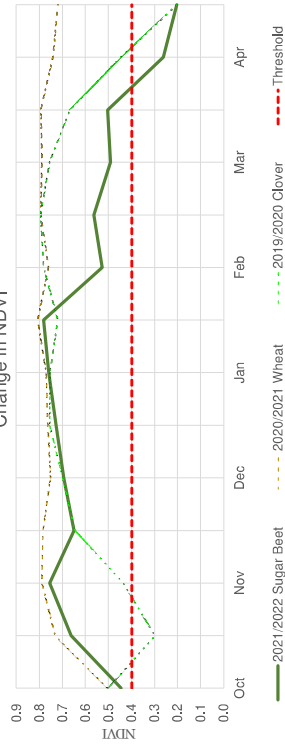
Picture (Age of Crop: 4 - 5 months)



Change in NDVI

Period	2019/2020	2020/2021	2021/2022
Oct I	0.50	0.50	0.44
Oct II	0.30	0.73	0.66
Nov I	0.44	0.79	0.75
Nov II	0.65	0.78	0.65
Dec I	0.70	0.75	0.69
Dec II	0.76	0.76	0.73
Jan I	0.75	0.77	0.76
Jan II	0.72	0.81	0.78
Feb I	0.78	0.76	0.53
Feb II	0.80	0.79	0.56
Mar I	0.76	0.79	0.49
Mar II	0.67	0.79	0.50
Apr I	0.45	0.74	0.26
Apr II	0.20	0.72	0.20
Max	0.80	0.81	0.78
Threshold	0.40		
Verdict	OK	OK	OK

Change in NDVI



Index: 38

Survey Date: 2022/02/07

Governorate: Fayoum

Sub-Region: Aros & Abo Seer (Inside)

Latitude: 29.26344

Longitude: 30.82622

Target Crop

Season	Crop
2021/2022	Onion
2020/2021	Clover
2019/2020	Wheat

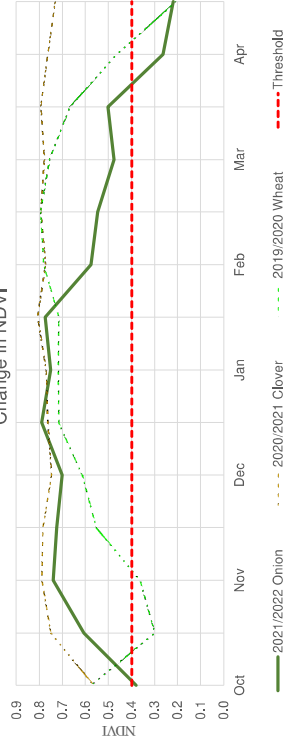
Picture (Age of Crop: 2 - 3 months)



Change in NDVI

Period	2019/2020	2020/2021	2021/2022
Oct I	0.58	0.56	0.38
Oct II	0.30	0.75	0.61
Nov I	0.36	0.79	0.74
Nov II	0.55	0.78	0.72
Dec I	0.61	0.75	0.70
Dec II	0.72	0.76	0.79
Jan I	0.72	0.77	0.75
Jan II	0.72	0.81	0.77
Feb I	0.78	0.77	0.58
Feb II	0.80	0.79	0.55
Mar I	0.76	0.78	0.48
Mar II	0.67	0.79	0.50
Apr I	0.47	0.76	0.26
Apr II	0.21	0.73	0.22
Max	0.80	0.81	0.79
Threshold	0.40		
Verdict	OK	OK	OK

Change in NDVI



Index: 39

Survey Date: 2022/02/07

Governorate: Fayoum

Sub-Region: Aros & Abo Seer (Inside)

Latitude: 29.27354

Longitude: 30.85497

Picture (Age of Crop: 2 - 3 months)



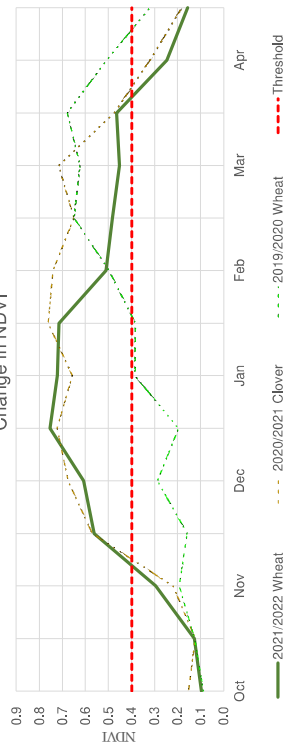
Target Crop

Season	Crop
2021/2022	Wheat
2020/2021	Clover
2019/2020	Wheat

Change in NDVI

Period	2019/2020	2020/2021	2021/2022
Oct I	0.09	0.15	0.10
Oct II	0.13	0.12	0.13
Nov I	0.19	0.22	0.30
Nov II	0.16	0.57	0.56
Dec I	0.29	0.68	0.61
Dec II	0.20	0.72	0.75
Jan I	0.39	0.66	0.72
Jan II	0.38	0.76	0.72
Feb I	0.50	0.74	0.51
Feb II	0.65	0.65	0.48
Mar I	0.62	0.72	0.45
Mar II	0.68	0.48	0.47
Apr I	0.51	0.32	0.25
Apr II	0.32	0.18	0.16
Max	0.68	0.76	0.75
Threshold	0.40		
Verdict	OK	OK	OK

Change in NDVI



Index: 40

Survey Date: 2022/02/07

Governorate: Fayoum

Sub-Region: Aros & Abo Seer (Outside)

Latitude: 29.33741

Longitude: 30.82662

Picture (Age of Crop: more than 1 year)



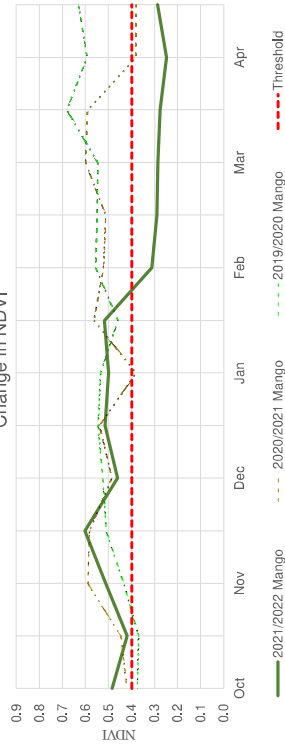
Target Crop

Season	Crop
2021/2022	Mango
2020/2021	Mango
2019/2020	Mango

Change in NDVI

Period	2019/2020	2020/2021	2021/2022
Oct I	0.38	0.42	0.48
Oct II	0.37	0.45	0.42
Nov I	0.43	0.59	0.51
Nov II	0.51	0.58	0.60
Dec I	0.53	0.49	0.46
Dec II	0.55	0.54	0.52
Jan I	0.53	0.38	0.50
Jan II	0.46	0.56	0.52
Feb I	0.56	0.52	0.31
Feb II	0.55	0.51	0.29
Mar I	0.55	0.60	0.28
Mar II	0.68	0.59	0.28
Apr I	0.59	0.38	0.25
Apr II	0.63	0.38	0.29
Max	0.68	0.60	0.60
Threshold	0.40		
Verdict	OK	OK	OK

Change in NDVI



Index: 41

Survey Date: 2022/02/07

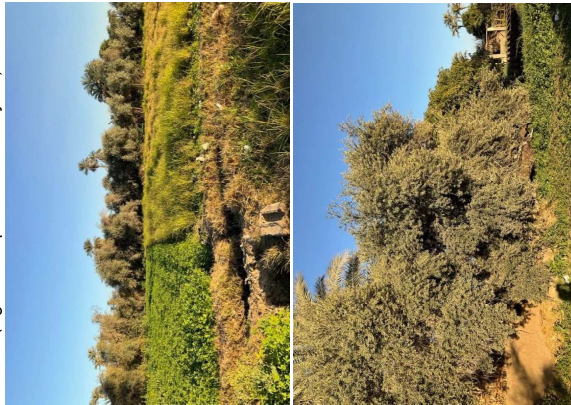
Governorate: Fayoum

Sub-Region: Aros & Abo Seer (Outside)

Latitude: 29.33731

Longitude: 30.82735

Picture (Age of Crop: more than 1 year)



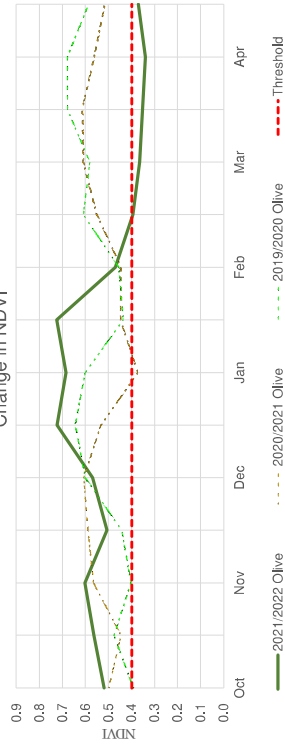
Target Crop

Season	Crop
2021/2022	Olive
2020/2021	Olive
2019/2020	Olive

Change in NDVI

Period	2019/2020	2020/2021	2021/2022
Oct I	0.39	0.50	0.52
Oct II	0.48	0.45	0.56
Nov I	0.40	0.57	0.60
Nov II	0.44	0.59	0.51
Dec I	0.60	0.61	0.57
Dec II	0.64	0.53	0.72
Jan I	0.60	0.37	0.68
Jan II	0.44	0.45	0.72
Feb I	0.46	0.45	0.47
Feb II	0.61	0.55	0.39
Mar I	0.58	0.61	0.37
Mar II	0.68	0.61	0.35
Apr I	0.68	0.56	0.34
Apr II	0.59	0.52	0.37
Max	0.68	0.61	0.72
Threshold	0.40		
Verdict	OK	OK	OK

Change in NDVI



Index: 42

Survey Date: 2022/08/01

Governorate: Fayoum

Sub-Region: Aros & Abo Seer (Outside)

Latitude: 29.33711

Longitude: 30.82527

Picture (Age of Crop: 1 - 2 months)



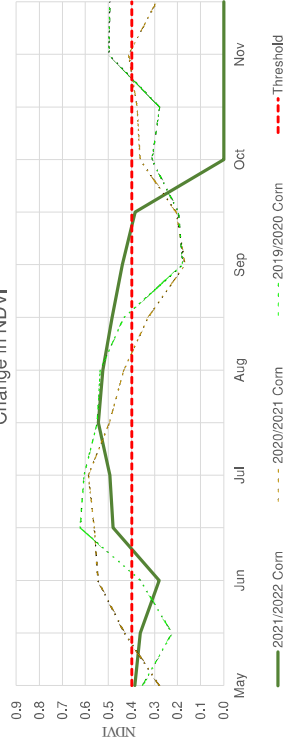
Target Crop

Season	Crop
2021/2022	Corn
2020/2021	Corn
2019/2020	Corn

Change in NDVI

Period	2020	2021	2022
May I	0.35	0.28	0.39
May II	0.23	0.43	0.36
Jun I	0.36	0.55	0.28
Jun II	0.62	0.56	0.48
Jul I	0.61	0.59	0.49
Jul II	0.55	0.50	0.54
Aug I	0.54	0.43	0.52
Aug II	0.43	0.33	0.48
Sep I	0.18	0.17	0.44
Sep II	0.20	0.21	0.38
Oct I	0.31	0.36	-
Oct II	0.28	0.38	-
Nov I	0.50	0.41	-
Nov II	0.49	0.29	-
Max	0.62	0.59	0.54
Threshold	0.40		
Verdict	OK	OK	OK

Change in NDVI



Index: 43

Survey Date: 2022/08/01

Governorate: Fayoum

Sub-Region: Aros & Abo Seer (Outside)

Latitude: 29.32

Longitude: 30.80795

Target Crop

Season	Crop
2021/2022	Corn
2020/2021	Cotton
2019/2020	Corn

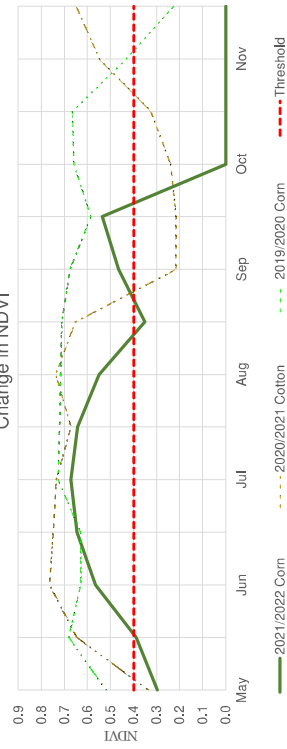
Picture (Age of Crop: 2 - 3 months)



Change in NDVI

Period	2020	2021	2022
May I	0.52	0.34	0.30
May II	0.68	0.65	0.39
Jun I	0.63	0.77	0.56
Jun II	0.63	0.75	0.64
Jul I	0.73	0.74	0.67
Jul II	0.72	0.67	0.64
Aug I	0.72	0.74	0.55
Aug II	0.71	0.65	0.35
Sep I	0.68	0.22	0.46
Sep II	0.59	0.22	0.53
Oct I	0.66	0.24	-
Oct II	0.67	0.32	-
Nov I	0.43	0.55	-
Nov II	0.23	0.65	-
Max	0.73	0.77	0.67
Threshold	0.40		
Verdict	OK	OK	OK

Change in NDVI



Index: 44

Survey Date: 2022/08/01

Governorate: Fayoum

Sub-Region: Aros & Abo Seer (Outside)

Latitude: 29.31284

Longitude: 30.80501

Target Crop

Season	Crop
2021/2022	Cotton
2020/2021	Corn
2019/2020	Corn

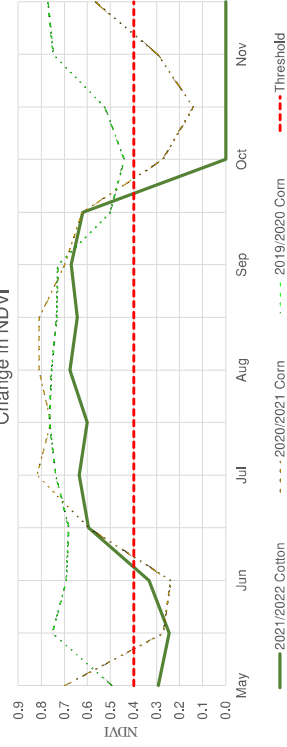
Picture (Age of Crop: 5 - 6 months)



Change in NDVI

Period	2020	2021	2022
May I	0.49	0.70	0.29
May II	0.75	0.27	0.24
Jun I	0.69	0.24	0.33
Jun II	0.68	0.60	0.60
Jul I	0.74	0.82	0.64
Jul II	0.77	0.76	0.60
Aug I	0.76	0.81	0.68
Aug II	0.73	0.81	0.64
Sep I	0.73	0.70	0.67
Sep II	0.50	0.62	0.62
Oct I	0.44	0.27	-
Oct II	0.53	0.14	-
Nov I	0.75	0.30	-
Nov II	0.77	0.57	-
Max	0.77	0.82	0.68
Threshold	0.40		
Verdict	OK	OK	OK

Change in NDVI



Index: 45

Survey Date: 2022/08/01

Governorate: Fayoum

Sub-Region: Aros & Abo Seer (Outside)

Latitude: 29.25398

Longitude: 30.89335

Picture (Age of Crop: less than 1 month)



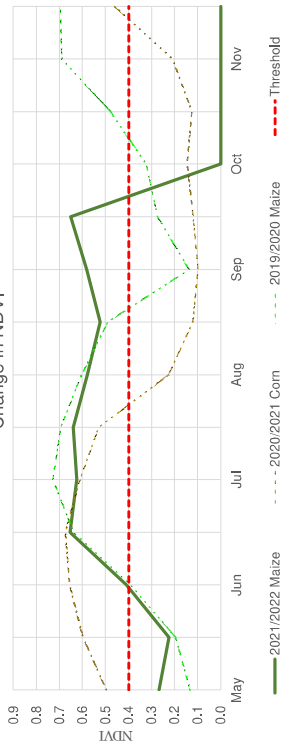
Target Crop

Season	Crop
2021/2022	Maize
2020/2021	Corn
2019/2020	Corn

Change in NDVI

Period	2020	2021	2022
May I	0.11	0.64	0.26
May II	0.23	0.66	0.25
Jun I	0.52	0.66	0.37
Jun II	0.63	0.67	0.55
Jul I	0.64	0.63	0.63
Jul II	0.63	0.40	0.62
Aug I	0.55	0.54	0.55
Aug II	0.27	0.57	0.50
Sep I	0.12	0.66	0.32
Sep II	0.15	0.60	0.26
Oct I	0.30	0.61	-
Oct II	0.27	0.43	-
Nov I	0.52	0.36	-
Nov II	0.60	0.10	-
Max	0.64	0.68	0.63
Threshold	0.40		
Verdict	OK	OK	OK

Change in NDVI



Index: 46

Survey Date: 2022/08/02

Governorate: Fayoum

Sub-Region: Aros & Abo Seer (Outside)

Latitude: 29.25431

Longitude: 30.87953

Picture (Age of Crop: 2 - 3 months)



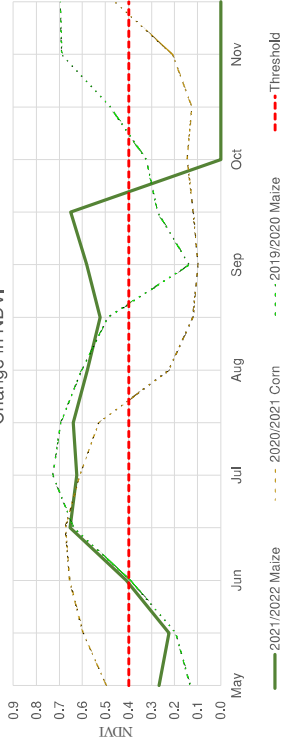
Target Crop

Season	Crop
2021/2022	Maize
2020/2021	Corn
2019/2020	Maize

Change in NDVI

Period	2020	2021	2022
May I	0.13	0.50	0.27
May II	0.20	0.60	0.22
Jun I	0.39	0.66	0.41
Jun II	0.64	0.68	0.65
Jul I	0.73	0.61	0.62
Jul II	0.69	0.53	0.64
Aug I	0.60	0.23	0.58
Aug II	0.49	0.12	0.52
Sep I	0.14	0.10	0.58
Sep II	0.27	0.12	0.65
Oct I	0.32	0.15	-
Oct II	0.48	0.13	-
Nov I	0.69	0.21	-
Nov II	0.70	0.46	-
Max	0.73	0.68	0.65
Threshold	0.40		
Verdict	OK	OK	OK

Change in NDVI



Index: 47

Survey Date: 2022/08/02

Governorate: Fayoum

Sub-Region: Aros & Abo Seer (Inside)

Latitude: 29.26337

Longitude: 30.82618

Picture (Age of Crop: 5 - 6 months)



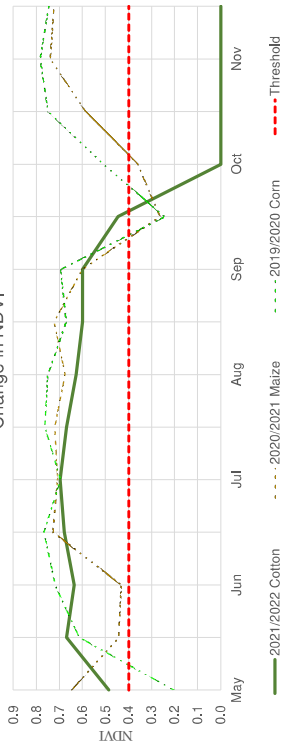
Target Crop

Season	Crop
2021/2022	Cotton
2020/2021	Maize
2019/2020	Corn

Change in NDVI

Period	2020	2021	2022
May I	0.20	0.65	0.49
May II	0.61	0.44	0.67
Jun I	0.72	0.43	0.64
Jun II	0.77	0.73	0.68
Jul I	0.70	0.71	0.70
Jul II	0.76	0.72	0.67
Aug I	0.75	0.68	0.63
Aug II	0.67	0.72	0.60
Sep I	0.70	0.60	0.60
Sep II	0.24	0.26	0.44
Oct I	0.51	0.36	-
Oct II	0.75	0.59	-
Nov I	0.78	0.74	-
Nov II	0.75	0.72	-
Max	0.78	0.74	0.70
Threshold	0.40		
Verdict	OK	OK	OK

Change in NDVI



Index: 48

Survey Date: 2022/08/02

Governorate: Fayoum

Sub-Region: Aros & Abo Seer (Outside)

Latitude: 29.37121

Longitude: 30.79899

Picture (Age of Crop: more than 1 year)



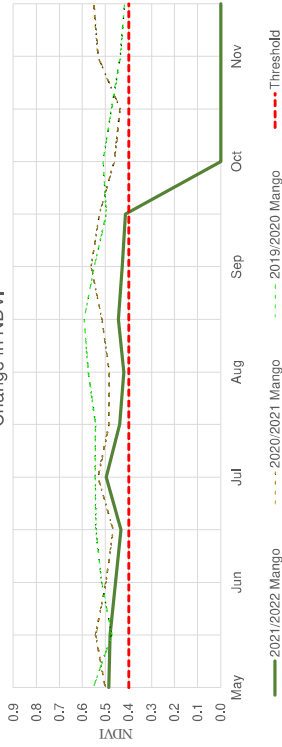
Target Crop

Season	Crop
2021/2022	Mango
2020/2021	Mango
2019/2020	Mango

Change in NDVI

Period	2020	2021	2022
May I	0.55	0.50	0.49
May II	0.47	0.54	0.48
Jun I	0.52	0.50	0.46
Jun II	0.54	0.47	0.43
Jul I	0.55	0.53	0.50
Jul II	0.54	0.49	0.44
Aug I	0.58	0.48	0.42
Aug II	0.59	0.52	0.44
Sep I	0.55	0.56	0.43
Sep II	0.50	0.53	0.41
Oct I	0.51	0.46	-
Oct II	0.47	0.44	-
Nov I	0.44	0.53	-
Nov II	0.42	0.55	-
Max	0.59	0.56	0.50
Threshold	0.40		
Verdict	OK	OK	OK

Change in NDVI



Index: 49

Survey Date: 2022/08/02

Governorate: Fayoum

Sub-Region: Aros & Abo Seer (Outside)

Latitude: 29.37018

Longitude: 30.80011

Target Crop

Season	Crop
2021/2022	Mango
2020/2021	Mango
2019/2020	Mango

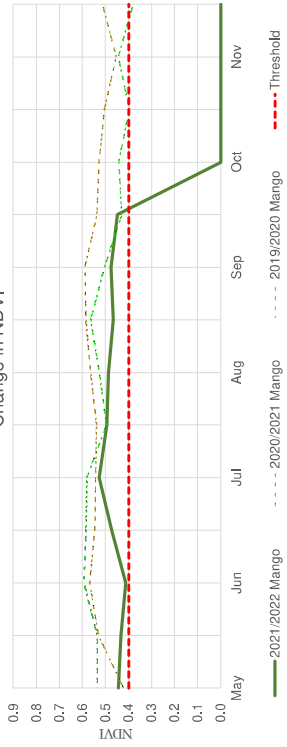
Picture (Age of Crop: more than 1 year)



Change in NDVI

Period	2020	2021	2022
May I	0.54	0.42	0.44
May II	0.54	0.53	0.43
Jun I	0.59	0.57	0.41
Jun II	0.58	0.55	0.47
Jul I	0.58	0.54	0.53
Jul II	0.50	0.54	0.49
Aug I	0.53	0.57	0.49
Aug II	0.56	0.59	0.47
Sep I	0.50	0.59	0.47
Sep II	0.43	0.54	0.45
Oct I	0.44	0.53	-
Oct II	0.40	0.51	-
Nov I	0.44	0.45	-
Nov II	0.38	0.51	-
Max	0.59	0.59	0.53
Threshold	0.40		
Verdict	OK	OK	OK

Change in NDVI



Index: 50

Survey Date: 2022/08/02

Governorate: Fayoum

Sub-Region: Aros & Abo Seer (Outside)

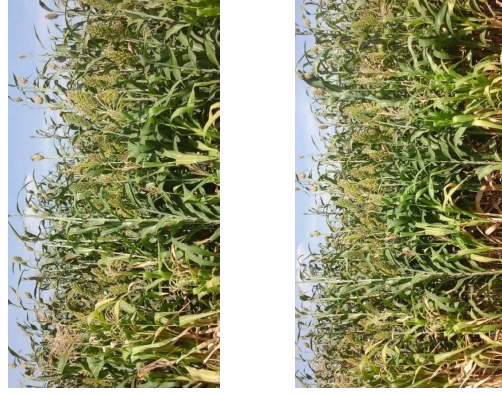
Latitude: 29.42957

Longitude: 30.77316

Target Crop

Season	Crop
2021/2022	Sorghum
2020/2021	Maize
2019/2020	Sorghum

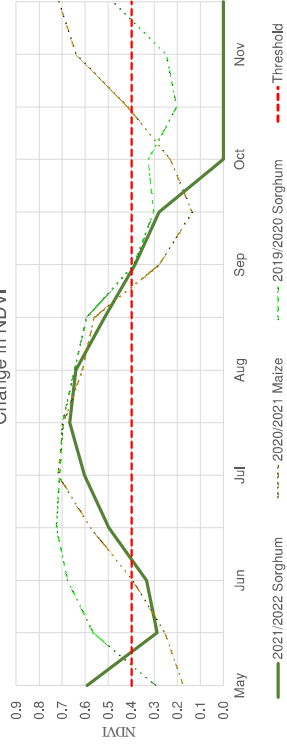
Picture (Age of Crop: 2 - 3 months)



Change in NDVI

Period	2020	2021	2022
May I	0.30	0.18	0.59
May II	0.57	0.26	0.29
Jun I	0.68	0.39	0.33
Jun II	0.73	0.58	0.50
Jul I	0.71	0.72	0.60
Jul II	0.70	0.69	0.67
Aug I	0.65	0.61	0.64
Aug II	0.60	0.56	0.52
Sep I	0.39	0.28	0.38
Sep II	0.30	0.14	0.28
Oct I	0.33	0.23	-
Oct II	0.20	0.42	-
Nov I	0.25	0.64	-
Nov II	0.48	0.71	-
Max	0.73	0.72	0.67
Threshold	0.40		
Verdict	OK	OK	OK

Change in NDVI



Index: 51

Survey Date: 2022/08/02

Governorate: Beni Suef

Sub-Region: Abo Shosha (Outside)

Latitude: 29.15862

Longitude: 31.08615

Picture (Age of Crop: 2 - 3 months)



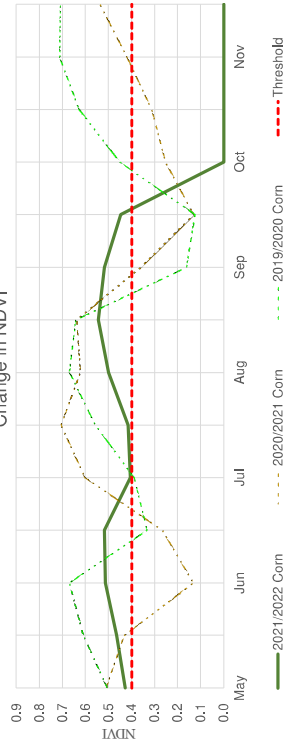
Target Crop

Season	Crop
2021/2022	Corn
2020/2021	Corn
2019/2020	Corn

Change in NDVI

Period	2020	2021	2022
May I	0.51	0.51	0.43
May II	0.61	0.43	0.46
Jun I	0.67	0.13	0.51
Jun II	0.33	0.27	0.52
Jul I	0.39	0.60	0.41
Jul II	0.56	0.71	0.41
Aug I	0.67	0.62	0.50
Aug II	0.64	0.64	0.54
Sep I	0.16	0.36	0.52
Sep II	0.13	0.13	0.45
Oct I	0.45	0.25	-
Oct II	0.63	0.31	-
Nov I	0.71	0.42	-
Nov II	0.71	0.54	-
Max	0.71	0.71	0.54
Threshold	0.40		
Verdict	OK	OK	OK

Change in NDVI



Index: 52

Survey Date: 2022/08/03

Governorate: Beni Suef

Sub-Region: Abo Shosha (Outside)

Latitude: 28.83568

Longitude: 30.89147

Picture (Age of Crop: 1 - 2 months)



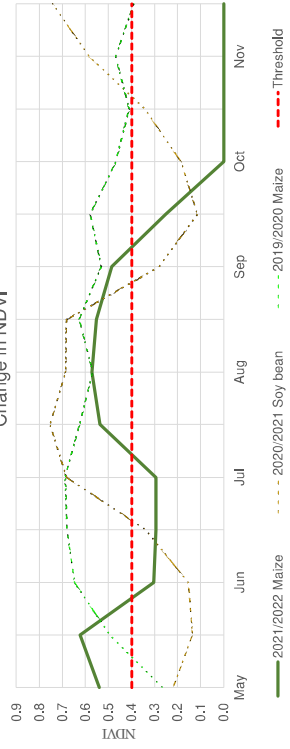
Target Crop

Season	Crop
2021/2022	Maize
2020/2021	Soy bean
2019/2020	Maize

Change in NDVI

Period	2020	2021	2022
May I	0.27	0.22	0.54
May II	0.50	0.14	0.62
Jun I	0.65	0.15	0.30
Jun II	0.68	0.34	0.29
Jul I	0.69	0.68	0.29
Jul II	0.63	0.75	0.54
Aug I	0.57	0.69	0.57
Aug II	0.63	0.68	0.55
Sep I	0.53	0.28	0.49
Sep II	0.58	0.11	0.25
Oct I	0.47	0.19	-
Oct II	0.41	0.34	-
Nov I	0.47	0.58	-
Nov II	0.39	0.74	-
Max	0.69	0.75	0.62
Threshold	0.40		
Verdict	OK	OK	OK

Change in NDVI



Index: 53

Survey Date: 2022/08/03

Governorate: Beni Suef

Sub-Region: Abo Shosha (Inside)

Latitude: 28.84109

Longitude: 30.85415

Picture (Age of Crop: more than 1 year)



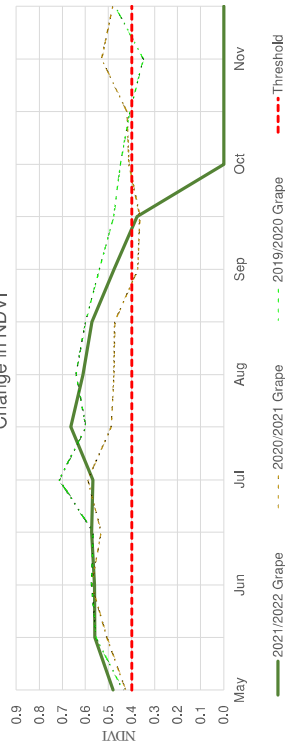
Target Crop

Season	Crop
2021/2022	Grape
2020/2021	Grape
2019/2020	Grape

Change in NDVI

Period	2020	2021	2022
May I	0.44	0.43	0.48
May II	0.56	0.51	0.56
Jun I	0.57	0.57	0.56
Jun II	0.57	0.53	0.57
Jul I	0.71	0.59	0.57
Jul II	0.60	0.49	0.66
Aug I	0.64	0.48	0.61
Aug II	0.60	0.47	0.57
Sep I	0.54	0.37	0.48
Sep II	0.48	0.36	0.38
Oct I	0.45	0.41	-
Oct II	0.41	0.42	-
Nov I	0.35	0.53	-
Nov II	0.47	0.48	-
Max	0.71	0.59	0.66
Threshold	0.40		
Verdict	OK	OK	OK

Change in NDVI



Index: 54

Survey Date: 2022/08/03

Governorate: Beni Suef

Sub-Region: Abo Shosha (Outside)

Latitude: 28.78387

Longitude: 30.81515

Picture (Age of Crop: 2 - 3 months)



Target Crop

Season	Crop
2021/2022	Cotton
2020/2021	Maize
2019/2020	Cotton

Change in NDVI

Period	2020	2021	2022
May I	0.17	0.66	0.27
May II	0.14	0.73	0.31
Jun I	0.13	0.68	0.48
Jun II	0.23	0.53	0.59
Jul I	0.69	0.46	0.63
Jul II	0.75	0.34	0.67
Aug I	0.70	0.32	0.60
Aug II	0.53	0.28	0.53
Sep I	0.16	0.13	0.50
Sep II	0.17	0.24	0.45
Oct I	0.39	0.43	-
Oct II	0.71	0.47	-
Nov I	0.78	0.61	-
Nov II	0.65	0.69	-
Max	0.78	0.73	0.67
Threshold	0.40		
Verdict	OK	OK	OK

Change in NDVI

