

## **Economic evaluation of relay intercropping and crop sequences systems from the perspective of crop intensification .**

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Crop Intensification systems are the most important systems that used by the farmer to increase the economic return of the land. Crop Intensification includes several systems such as simultaneous and relay intercropping and successions crops .

Among the factors that farmers take into account are the economic factors in terms of the price of seeds, fertilizers, insecticides and fungicides as well as the selling price of the crops to be able to choose the appropriate system for use , compared with the traditional systems.

A lot of intercropping trails are evaluated on basis of LER equation ( Biological basis ), while no attention is paid for economics of intercropping, e.g., price of major or secondary crops in addition to the land occupied by any of them or even the productivity evaluated as cash money are not taken in account. Since the Egyptian farmer evaluates the economics of intercropping on the basis of cash money incomes, attention must be paid for his view point if adoption of one or another of intercropping system is recommended.

It has therefore equations have been established for the economic valuation of crop intensification systems on the bases of biological yield and economic parameters from perspective of the crop intensification specialists

These equations has included the factors that intervene in the agricultural process, that affecting the final production of the system and also the economic return to land for calculate the economic returns of such systems compared with the traditional methods used by farmers is the reference to the profit or loss and thus the success or failure of the proposed system . One of the features proposed equivalencies that can predict how the success or failure of the proposed system through price policy of inputs on the market . So we can monitor the spread of the implementation of the proposed programs in pursuing the market prices .

The agricultural year usually starts soon after harvesting the preceding autumn, which beginning of October and ended before the beginning of November in the next year . The agricultural year will consider 365 days ( 100 % duration) . The duration by days of sequential were accounted from the date of the first crop planting until harvesting date of the last crop . It was called “Area time land occupied “ , and expressed as a percentage as follows: duration by days / 365 days(100% duration) . ( El-Hawary, 2009)

Concerning relay intercropping and crop sequences systems there are many factors need to be included in the cost of production estimates that all farms should be calculating as they consider length of rotation and cropping sequences , water irrigation quantity addition to the price of seeds, fertilizers, insecticides and fungicides as well as the selling price of the crops to be able to choose the appropriate system for use , compared with the traditional systems.

Formulas were established for relay intercropping and crop sequences evaluations based on biological and economical parameters from crop intensification perspective . The formulas were established for estimating the Economical Yield Advantage Ratio ( EYAR) of the relay intercropping and crop sequence systems .

**1-Evaluation of relay intercropping in comparison with a traditional sequence (EYER<sub>1</sub>):**

Economical Yield Advantage Ratio (relay/ sequ.) (EYAR<sub>1</sub>): (El-Hawary, 2009 )

$$EYAR_1 = \left[ \left( \sum_{i=1}^n \left( \sum_{j=1}^{n-} Y_{aij} Pr_{aij} \right) - \sum_{i=1}^n Co_{ai} \right) D_b \right] \left[ \left( \sum_{L=1}^m \left( \sum_{k=1}^{m-} (Y_{bLK} Pr_{bLK}) - Co_{bL} \right) \right) D_a \right]^{-1}$$

Economical Yield Advantage Ratio as percentage = (( EYAR1) -1)x 100= + %

Where :

Formula numerator should be occupied by crop sequence (a) (relay intercropping crops) .

Formula denominator should be occupied by crop sequence (b).

*n* : number of crops pertaining to crop sequence (a) . *n-* : number of main and by products together of the crop . Which *n-* varies according to each crop.

*Y<sub>aij</sub>* , *Pr<sub>aij</sub>* and *Co<sub>aij</sub>* :Yield, price and production cost ( main and by products )of each crop pertaining to crop sequence (a) , respectively.

*m*: number of crops pertaining to crop sequence (b) . *m-* : number of main and by products together of the crop . Which *m-* varies according to each crop.

*Y<sub>bLK</sub>* , *Pr<sub>bLK</sub>* and *Co<sub>bLK</sub>* :Yield, price and production cost ( main and by products ) of each crop

pertaining to crop sequence (b) , respectively.

$D_a$  and  $D_b$  : Crop sequence (a) and crop sequence (b) durations by days, respectively. .

EYAR<sub>1</sub> value was relative to the net return per day of compared sequence(b) .

**The computation of yield advantage net return of evaluated sequence is as follows:**

$$= \text{Net return of evaluated sequence "a"} - \text{net return of compared sequence "b"}$$

**Example 1 :**

<b>Relay intercropping ( sequence "a")</b>			
	<b>Yield</b>	<b>Price</b>	<b>Costs</b>
Wheat: main product : Grain	$Y_{a11}= 3.180 \text{ Ton/Fed.}$	$Pr_{a11}=1100 \text{ LE/Ton}$	$Co_{a1} =1921 \text{ LE/Fed}$
by product :Straw	$Y_{a12}= 2.77 \text{ Ton/Fed}$	$Pr_{a12}=500 \text{ LE/Ton}$	
Cotton	$Y_{a21}= 8.3 \text{ kentar/Fed.}$	$Pr_{a21} =850 \text{ LE/kentar}$	$Co_{a2} =2622 \text{ LE/fed}$
Duration	$D_a=334 \text{ days}$		
Total costs			$Co_{a1+z2}=4543\text{LE/Fed}$
<b>Crop sequence (b) (compared sequence )</b>			
Two –cut clover	$Y_{b1}= 15 \text{ ton/Fed.}$	$Pr_{b1}=140 \text{ LE/Ton}$	$Co_{b1}=900 \text{ LE/Fed}$
Cotton	$Y_{b2}= 8.5\text{kentar/Fed.}$	$Pr_{b2} =850 \text{ LE/kentar}$	$Co_{b2} =2622 \text{ LE/fed}$
Duration	$D_b=388 \text{ days}$		

Economical Yield Advantage Ratio (relay/ sequ.) (EYAR<sub>1</sub>)

$$= [((3.18 \times 1100 + 2.77 \times 500 + 8.3 \times 850) - 4543) / 334] / [((15 \times 140 - 900) + (8.5 \times 850 - 2622)) / 388]^{-1}$$

$$= [22.1407(\text{NR /day of sequence "a"})] / [14.9561(\text{NR /day of sequence "b"})]^{-1} = 1.48087 (+ 48.037 \%)$$

EYAR<sub>1</sub> value observed that the net return per day of evaluated sequence increased by 48.087% over the net return per day of compared sequence (b) .

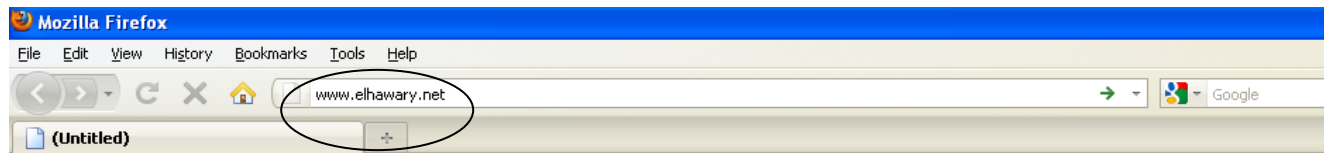
**Yield Advantage net return of sequence "a"** =  $(11938 - 4543) - (9325 - 3522) = 1592.5 \text{ LE/F.}$

It means ,if the farmer grown the relay intercropping, he will get the net return of the compared sequence plus **1592.5 LE/F.**

## Web application for the formulas of sequences systems evaluation .

For the easy usage of the sequence systems evaluation formulas, a web application has been designed on the website “ [www.elhawary.net](http://www.elhawary.net) “. The web application can be used if the following steps have been applied .

**Step1** . Open the web page and Type "www. elhawary.net ". Then press Enter Button .



**Step2** . After pressing the Enter Button , the website page will appear as follows :

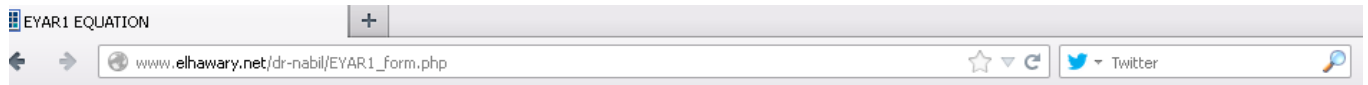
A screenshot of the website page for Prof. Dr. Nabil El-Hawary. The page features a blue header with the name 'Prof. Dr. Nabil El-Hawary' and the email 'dr-nabil@elhawary.net'. Below the header is a profile picture of Prof. Dr. Nabil El-Hawary, a man with glasses and a suit. To the right of the profile picture is a list of 'NEW WEB APPLICATIONS FOR EYAR & MELER EQUATIONS':

- EYAR1 = (Relay Intercropping System/Crop Sequence System)
- EYAR2 = (Crop Sequence System A/Crop Sequence System B)
- EYAR3 = (Crop Sequence System/Relay Intercropping System)
- EYAR4 = (Relay Intercropping System A/Relay Intercropping System B)
- EYAR5 = (The General Formula Of Successions Evaluation)

Below the list is the text 'MELER' and 'How to use the web application for equations'. At the bottom, there is a note: '\* Equations and formulas that have been suggested by Prof. Dr Nabil Awad El-Hawary'. The page also includes a 'Publications' section with a small image of a landscape.

**Step 3.** Find formulas icons or formula name , for example **EYER<sub>1</sub>** equation, press on it . The

formula page will appear containing the table in which the data will be entered in it



### RELAY INTERCROPPING SYSTEM

(MU) : Money Unit  
(AU) : Area Unit

RELAY INTERCROPPING DURATION :  DAYS

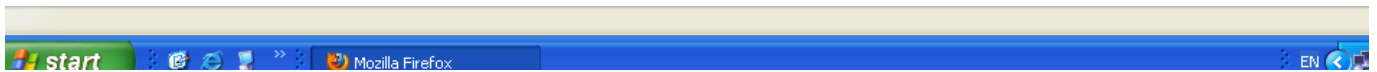
CROP SEQUENCE	COST/(AU) (MU)	MAIN PRODUCT		BY PRODUCT 1		BY PRODUCT 2	
		(ARDAB/TON)	(MU)	(ARDAB/TON)	(MU)	(ARDAB/TON)	(MU)
CROP 1 :		Yield : <input type="text"/>	Price : <input type="text"/>	Yield : <input type="text"/>	Price : <input type="text"/>	Yield : <input type="text"/>	Price : <input type="text"/>
CROP 2 :		Yield : <input type="text"/>	Price : <input type="text"/>	Yield : <input type="text"/>	Price : <input type="text"/>	Yield : <input type="text"/>	Price : <input type="text"/>
CROP 3 :		Yield : <input type="text"/>	Price : <input type="text"/>	Yield : <input type="text"/>	Price : <input type="text"/>	Yield : <input type="text"/>	Price : <input type="text"/>
CROP 4 :		Yield : <input type="text"/>	Price : <input type="text"/>	Yield : <input type="text"/>	Price : <input type="text"/>	Yield : <input type="text"/>	Price : <input type="text"/>
CROP 5 :		Yield : <input type="text"/>	Price : <input type="text"/>	Yield : <input type="text"/>	Price : <input type="text"/>	Yield : <input type="text"/>	Price : <input type="text"/>
CROP 6 :		Yield : <input type="text"/>	Price : <input type="text"/>	Yield : <input type="text"/>	Price : <input type="text"/>	Yield : <input type="text"/>	Price : <input type="text"/>
TOTAL COSTS :	<input type="text"/>						

### CROP SEQUENCE SYSTEM

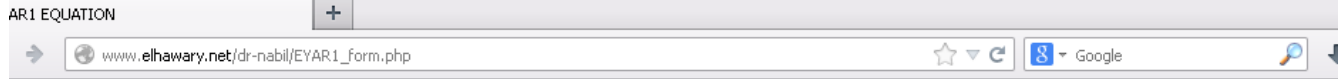
SEQUENCE DURATION :  DAYS

CROP SEQUENCE	COST/(AU) (MU)	MAIN PRODUCT		BY PRODUCT 1		BY PRODUCT 2	
		(ARDAB/TON)	(MU)	(ARDAB/TON)	(MU)	(ARDAB/TON)	(MU)
CROP 1 :	<input type="text"/>	Yield : <input type="text"/>	Price : <input type="text"/>	Yield : <input type="text"/>	Price : <input type="text"/>	Yield : <input type="text"/>	Price : <input type="text"/>
CROP 2 :	<input type="text"/>	Yield : <input type="text"/>	Price : <input type="text"/>	Yield : <input type="text"/>	Price : <input type="text"/>	Yield : <input type="text"/>	Price : <input type="text"/>
CROP 3 :	<input type="text"/>	Yield : <input type="text"/>	Price : <input type="text"/>	Yield : <input type="text"/>	Price : <input type="text"/>	Yield : <input type="text"/>	Price : <input type="text"/>
CROP 4 :	<input type="text"/>	Yield : <input type="text"/>	Price : <input type="text"/>	Yield : <input type="text"/>	Price : <input type="text"/>	Yield : <input type="text"/>	Price : <input type="text"/>
CROP 5 :	<input type="text"/>	Yield : <input type="text"/>	Price : <input type="text"/>	Yield : <input type="text"/>	Price : <input type="text"/>	Yield : <input type="text"/>	Price : <input type="text"/>
CROP 6 :	<input type="text"/>	Yield : <input type="text"/>	Price : <input type="text"/>	Yield : <input type="text"/>	Price : <input type="text"/>	Yield : <input type="text"/>	Price : <input type="text"/>

Generate Result



**Step 4.** After enter the data , click on “ Generate results “ to appears the result.



**RELAY INTERCROPPING SYSTEM**

U) : Money Unit

J) : Area Unit

RELAY INTERCROPPING DURATION :  DAYS

CROP SEQUENCE	COST/(AU) (MU)	MAIN PRODUCT (ARDAB/TON) (MU)		BY PRODUCT 1 (ARDAB/TON) (MU)		BY PRODUCT 2 (ARDAB/TON) (MU)	
		Yield	Price	Yield	Price	Yield	Price
CROP 1 :		3.180	1100	2.77	500		
CROP 2 :		8.3	850				
CROP 3 :							
CROP 4 :							
CROP 5 :							
CROP 6 :							
<b>TOTAL COSTS :</b>	<b>4543</b>						

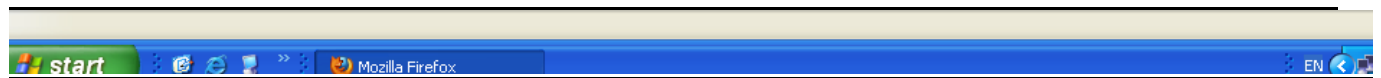
**CROP SEQUENCE SYSTEM**

SEQUENCE DURATION :  DAYS

CROP SEQUENCE	COST/(AU) (MU)	MAIN PRODUCT (ARDAB/TON) (MU)		BY PRODUCT 1 (ARDAB/TON) (MU)		BY PRODUCT 2 (ARDAB/TON) (MU)	
		Yield	Price	Yield	Price	Yield	Price
CROP 1 :	900	15	140				
CROP 2 :	2622	8.5	850				
CROP 3 :							
CROP 4 :							
CROP 5 :							
CROP 6 :							

Generate Result

EYAR1 (RELAY INTERCROPPING SYSTEM/CROP SEQUENCE SYSTEM) = 1.48 (48.037%)  
YIELD ADVANTAGE NET RETURN = 1592



**Important Note:** Do not Type any thing in the empty cells and leave it as is.

## **2-Evaluation of sequence in comparison with another sequence ( EYER<sub>2</sub>):**

Economical Yield Advantage Ratio (sequ/ sequ.) (EYAR<sub>2</sub>) : ( El-Hawary, 2009 )

$$EYAR_2 = \frac{[(\sum_{i=1}^n (\sum_{j=1}^{n'} (Y_{aij} Pr_{aij}) - Co_{ai})) D_b]}{[(\sum_{L=1}^m (\sum_{k=1}^{m'} (Y_{bLk} Pr_{bLK}) - Co_{bL})) D_a]}^{-1}$$

Economical Yield Advantage Ratio(sequ/ sequ.) as percentage = (( EYAR<sub>2</sub>) -1)x 100= + %

Formula numerator should be occupied by the wished sequence for evaluation. While the formula denominator should be occupied by the other sequence as a comparing.

$n$  : number of crops pertaining to crop sequence (a) .  $n'$  : number of main and by products together of the crop . Which  $n'$  varies according to each crop.

$Y_{aij}$  ,  $Pr_{aij}$  and  $Co_{aij}$  :Yield, price and production cost ( main and by products )of each crop pertaining to crop sequence (a) , respectively.

$m$ : number of crops pertaining to crop sequence (b) .  $m'$  : number of main and by products together the crop . Which  $m'$  varies according to each crop.

$Y_{bLK}$  ,  $Pr_{bLK}$  and  $Co_{bLK}$  :Yield, price and production cost ( main and by products ) of each crop pertaining to crop sequence (b) , respectively.

$D_a$  and  $D_b$  : Crop sequence (a) and crop sequence (b) durations by days, respectively. .

EYAR<sub>2</sub> value was relative to the net return per day of compared sequence .

**The computation of yield advantage net return of evaluated sequence is as follows:**

$$= \text{Net return of evaluated sequence "a"} - \text{net return of compared sequence "b"}$$

**Example 2 :**

Sequence (a)			
Fba baen :	Yield	price	costs
Seeds:			
Straw	$Y_{b11} = 1.477 \text{ Ton/Fed.}$	$Pr_{b11} = 1800 \text{ LE/Ton}$	$Co_{b1} = 1841 \text{ LE/Fed}$
	$Y_{b12} = 1.362 \text{ Ton/F.}$	$Pr_{b12} = 134 \text{ LE/Ton}$	
Summer maize :			
Geains:	$Y_{b21} = 4.02 \text{ Ton/F}$	$Pr_{b21} = 967 \text{ LE/Ton}$	$Co_{b2} = 2484 \text{ LE/fed}$
Straw:	$Y_{b22} = 2.913 \text{ Ton/F}$	$Pr_{b22} = 127 \text{ LE/F}$	
Duration	$D_b = 352 \text{ days}$		
Sequence (b) ( Traditional sequence )			
Faba bean:	Yield	price	costs
Seeds:	$Y_{a11} = 1.503 \text{ Ton/Fed.}$	$Pr_{a11} = 1800 \text{ LE/Ton}$	$Co_{a1} = 1800 \text{ LE/Fed}$
Straw:	$Y_{a12} = 1.530 \text{ Ton/Fed}$	$Pr_{a12} = 134 \text{ LE/Ton}$	
Summer Maize:			
Grains:	$Y_{a21} = 4.137 \text{ Ton/Fed.}$	$Pr_{a21} = 967 \text{ LE/Ton}$	$Co_{a2} = 1838 \text{ LE/fed}$
Straw:	$Y_{a22} = 3.120 \text{ Ton/Fed.}$	$Pr_{a22} = 127 \text{ LE/ Ton}$	
Fall Maize:			
Grains:	$Y_{a31} = 2.085 \text{ Ton/Fed.}$	$Pr_{a31} = 967 \text{ LE/Ton}$	$Co_{a3} = 1950 \text{ LE/F.}$
Straw:	$Y_{a32} = 3.234 \text{ Ton/Fed.}$	$Pr_{a32} = 127 \text{ LE/ Ton}$	
Duration	$D_a = 418 \text{ days}$		

Economical Yield Advantage Ratio <sub>(sequ/ sequ.)</sub> (EYAR<sub>2</sub>)

$$= [ (( (1.477 \times 1800 + 1.362 \times 134 - 1841) ) + ( 4.02 \times 967 + 2.913 \times 127 - 2484)) 418] [ ((1.503 \times 1800 + 1.530 \times 134 - 1800) + (4.137 \times 967 + 3.12 \times 127 - 1838) + (2.085 \times 967 + 3.234 \times 127 - 1950)) 352 ]^{-1} =$$

$$= [7.878974 \text{ ( Net return /day of sequence (a))}] [ 9.614957 \text{ (Net return /day of sequence (b))}]^{-1} =$$

$$EYAR_2 = ( 7.87897 / 9.614957) = 0.7943$$

$$EYAR_2 \text{ as percentage} = (( EYAR_2) - 1) \times 100 = ( 0.7943 - 1) \times 100 = -20.565 \%$$

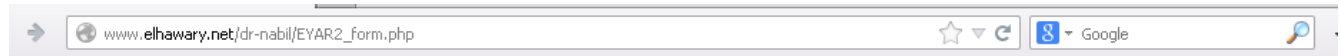
EYAR<sub>2</sub> value observed that the net return per day of evaluated sequence was lower than the net return per day of the compared sequence (b) by 20.565 % .



**Yield Advantage ( or disadvantage ) net return of sequence "a" :**

$$=( 7098.399 - 4325) - (9734.052- 5588) = -1372.653\text{LE/F.}$$

It means ,if the farmer grown sequence (a) , he will lose **1372.6531** LE from the net return of the compared sequence .



**CROP SEQUENCE SYSTEM A**

RELAY INTERCROPPING DURATION : 352 DAYS

CROP SEQUENCE	COST/F. LE	MAIN PRODUCT		BY PRODUCT 1		BY PRODUCT 2	
		(ARDAB/TON)	LE	(ARDAB/TON)	LE	(ARDAB/TON)	LE
CROP 1 :	1841	Yield : 1.477	Price : 1800	Yield : 1.362	Price : 134	Yield :	Price :
CROP 2 :	2484	Yield : 4.02	Price : 967	Yield : 2.913	Price : 127	Yield :	Price :
CROP 3 :		Yield :	Price :	Yield :	Price :	Yield :	Price :
CROP 4 :		Yield :	Price :	Yield :	Price :	Yield :	Price :
CROP 5 :		Yield :	Price :	Yield :	Price :	Yield :	Price :
CROP 6 :		Yield :	Price :	Yield :	Price :	Yield :	Price :

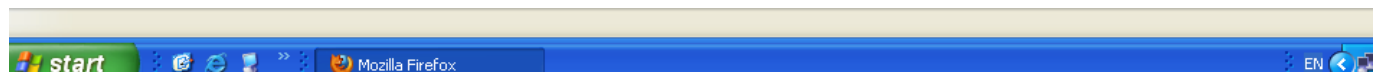
**CROP SEQUENCE SYSTEM B**

SEQUENCE DURATION : 418 DAYS

CROP SEQUENCE	COST/F. LE	MAIN PRODUCT		BY PRODUCT 1		BY PRODUCT 2	
		(ARDAB/TON)	LE	(ARDAB/TON)	LE	(ARDAB/TON)	LE
CROP 1 :	1800	Yield : 1.503	Price : 1800	Yield : 1.53	Price : 134	Yield :	Price :
CROP 2 :	1838	Yield : 4.137	Price : 967	Yield : 3.12	Price : 127	Yield :	Price :
CROP 3 :	1950	Yield : 2.085	Price : 967	Yield : 3.234	Price : 127	Yield :	Price :
CROP 4 :		Yield :	Price :	Yield :	Price :	Yield :	Price :
CROP 5 :		Yield :	Price :	Yield :	Price :	Yield :	Price :
CROP 6 :		Yield :	Price :	Yield :	Price :	Yield :	Price :

Generate Result

EYAR2 (CROP SEQUENCE SYSTEM A/CROP SEQUENCE SYSTEM B) = 0.794(-20.565%)  
YIELD ADVANTAGE NET RETURN = -1372.653 LE/F



### **3-Evaluation of a sequence in comparison with relay intercropping system( EYAR<sub>3</sub>)**

:

Economical Yield Advantage Ratio <sub>(sequ/ relay.)</sub> (EYAR<sub>3</sub>) : ( **El-Hawary, 2009** )

$$EYAR_3 = \left[ \left( \sum_{i=1}^n \left( \sum_{j=1}^{n'} (Y_{aij} Pr_{aij}) - Co_{ai} \right) D_b \right) \right] \left[ \left( \sum_{L=1}^m \left( \sum_{k=1}^{m'} (Y_{bLk} Pr_{bLk}) - \sum_{L=1}^m Co_{bj} \right) D_a \right) \right]^{-1}$$

Economical Yield Advantage Ratio<sub>(sequ/ relay.)</sub> as percentage = (( EYAR<sub>3</sub>) -1)x 100= ± %

For applying the EYAR3 equation ,the sequence that wished to evaluation should be occupied the formula numerator , while the relay intercropping that used as a comparing should be occupied the denominator of formula .

*n* : number of crops pertaining to crop sequence (a) . *n'* : number of main and by products together of the crop . Which *n'* varies according to each crop.

*Y<sub>aij</sub>* , *Pr<sub>aij</sub>* and *Co<sub>aij</sub>* :Yield, price and production cost ( main and by products )of each crop pertaining to crop sequence (a) , respectively.

*m*: number of crops pertaining to crop sequence (b) . *m'* : number of main and by products together the crop . Which *m'* varies according to each crop.

*Y<sub>bLK</sub>* ,*Pr<sub>bLK</sub>* and *Co<sub>bLK</sub>* : Yield, price and production cost ( main and by products ) of each crop pertaining to crop sequence (b) , respectively.

*D<sub>a</sub>* and *D<sub>b</sub>* : Crop sequence (a) and crop sequence (b) durations by days, respectively. .

EYAR<sub>3</sub> value was relative to the net return per day of compared sequence(b) .

**The computation of yield advantage net return of evaluated sequence is as follows:**

= Net return of evaluated sequence "a" - net return of compared sequence "b"

#### 4-Evaluation of relay intercropping comparing with another relay intercropping

##### system ( EYAR<sub>4</sub>):

Economical Yield Advantage Ratio (relay/ relay.) (EYAR<sub>4</sub>) : (El-Hawary, 2009)

$$EYAR_4 = \left[ \left( \sum_{i=1}^n \left( \sum_{j=1}^{n-} Y_{aij} Pr_{aij} \right) - \sum_{i=1}^n Co_{ai} \right) D_b \right] \left[ \left( \sum_{L=1}^m \left( \sum_{k=1}^{m-} Y_{bLK} Pr_{bLK} \right) - \sum_{L=1}^m Co_{bL} \right) D_a \right]^{-1}$$

Economical Yield Advantage Ratio (relay/ relay.) as percentage = (( EYAR<sub>4</sub>) -1)x 100= ± %

For applying the EYAR<sub>3</sub> equation ,the relay intercropping that wished to evaluation should be occupied the formula numerator , while the relay intercropping that used as a comparing should be occupied the denominator of formula .

$n$  : number of crops pertaining to crop sequence (a) .  $n^-$  : number of main and by products together of the crop . Which  $n^-$  varies according to each crop.

$Y_{aij}$  ,  $Pr_{aij}$  and  $Co_{aij}$  :Yield, price and production cost ( main and by products )of each crop pertaining to crop sequence (a) , respectively.

$m$ : number of crops pertaining to crop sequence (b) .  $m^-$  : number of main and by products together the crop . Which  $m^-$  varies according to each crop.

$Y_{bLK}$  , $Pr_{bLK}$  and  $Co_{bLK}$  : Yield, price and production cost ( main and by products ) of each crop pertaining to crop sequence (b) , respectively.

$D_a$  and  $D_b$  : Crop sequence (a) and crop sequence (b) durations by days, respectively. .

EYAR<sub>4</sub> value was relative to net return per day of compared sequence(b) .

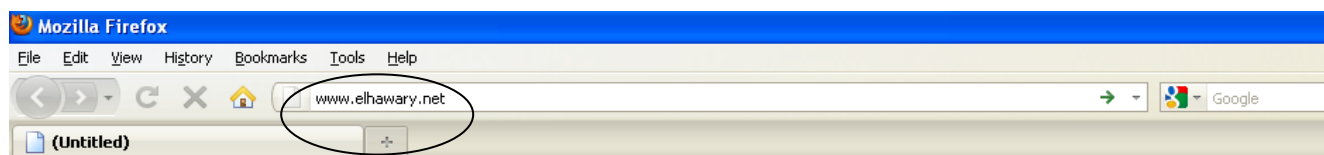
**The computation of yield advantage net return of evaluated sequence is as follows:**

$$= \text{Net return of evaluated sequence "a"} - \text{net return of compared sequence "b"}$$


## Web application for the formulas of intercropping systems evaluation .

من أجل استخدام الصيغ الخاصة بتقييم نظم التعاقب فإنه تم تصميم صفحة ويب على الموقع " [www.elhawary.net](http://www.elhawary.net) " ويمكن استخدام صفحة الويب بإتباع الخطوات التالية :

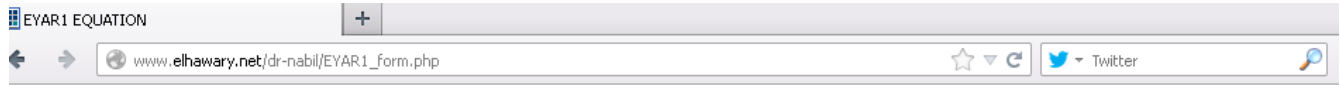
الخطوه 1 : إفتح صفحة الويب بكتابه اسم الموقع " [www.elhawary.net](http://www.elhawary.net) " ثم إضغط على زر إدخال .



الخطوه 2: بعد الضغط على زر ادخال سوف تظهر الصفحة التاليه :

A screenshot of the website for Prof. Dr. Nabil El-Hawary. The page has a blue header with the name "Prof. Dr. Nabil El-Hawary" and the email "dr-nabil@elhawary.net". Below the header, there is a profile picture of Prof. Dr. Nabil El-Hawary, a research professor at the Agricultural Research Center, Egypt. To the right of the profile picture, there is a list of "NEW WEB APPLICATIONS FOR EYAR & MELER EQUATIONS" with five items: EYAR1, EYAR2, EYAR3, EYAR4, and EYAR5. Below the list, there is a section titled "How to use the web application for equations" with the text "كيف تستخدم تطبيق الويب للمعادلات". At the bottom, there is a note: "\* Equations and formulas that have been suggested by Prof. Dr Nabil Awad El-Hawary". The page is displayed in a browser window with the Windows taskbar visible at the bottom.

**الخطوة 3:** إبحث عن اسم المعادله " على سبيل المثال معادله EYER<sub>1</sub> اضغط عليه سوف تظهر لك صفحه المعادله محتويه على الجدول التي سيتم إدخال البيانات فيه .



**RELAY INTERCROPPING SYSTEM**

(MU) : Money Unit  
(AU) : Area Unit

RELAY INTERCROPPING DURATION :  DAYS

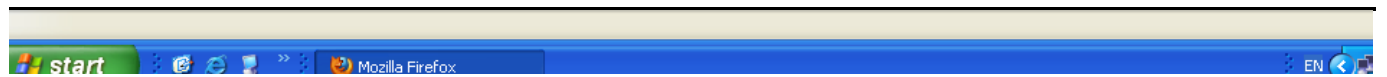
CROP SEQUENCE	COST/(AU) (MU)	MAIN PRODUCT		BY PRODUCT 1		BY PRODUCT 2	
		(ARDAB/TON)	(MU)	(ARDAB/TON)	(MU)	(ARDAB/TON)	(MU)
CROP 1 :		Yield : <input type="text"/>	Price : <input type="text"/>	Yield : <input type="text"/>	Price : <input type="text"/>	Yield : <input type="text"/>	Price : <input type="text"/>
CROP 2 :		Yield : <input type="text"/>	Price : <input type="text"/>	Yield : <input type="text"/>	Price : <input type="text"/>	Yield : <input type="text"/>	Price : <input type="text"/>
CROP 3 :		Yield : <input type="text"/>	Price : <input type="text"/>	Yield : <input type="text"/>	Price : <input type="text"/>	Yield : <input type="text"/>	Price : <input type="text"/>
CROP 4 :		Yield : <input type="text"/>	Price : <input type="text"/>	Yield : <input type="text"/>	Price : <input type="text"/>	Yield : <input type="text"/>	Price : <input type="text"/>
CROP 5 :		Yield : <input type="text"/>	Price : <input type="text"/>	Yield : <input type="text"/>	Price : <input type="text"/>	Yield : <input type="text"/>	Price : <input type="text"/>
CROP 6 :		Yield : <input type="text"/>	Price : <input type="text"/>	Yield : <input type="text"/>	Price : <input type="text"/>	Yield : <input type="text"/>	Price : <input type="text"/>
TOTAL COSTS :	<input type="text"/>						

**CROP SEQUENCE SYSTEM**

SEQUENCE DURATION :  DAYS

CROP SEQUENCE	COST/(AU) (MU)	MAIN PRODUCT		BY PRODUCT 1		BY PRODUCT 2	
		(ARDAB/TON)	(MU)	(ARDAB/TON)	(MU)	(ARDAB/TON)	(MU)
CROP 1 :	<input type="text"/>	Yield : <input type="text"/>	Price : <input type="text"/>	Yield : <input type="text"/>	Price : <input type="text"/>	Yield : <input type="text"/>	Price : <input type="text"/>
CROP 2 :	<input type="text"/>	Yield : <input type="text"/>	Price : <input type="text"/>	Yield : <input type="text"/>	Price : <input type="text"/>	Yield : <input type="text"/>	Price : <input type="text"/>
CROP 3 :	<input type="text"/>	Yield : <input type="text"/>	Price : <input type="text"/>	Yield : <input type="text"/>	Price : <input type="text"/>	Yield : <input type="text"/>	Price : <input type="text"/>
CROP 4 :	<input type="text"/>	Yield : <input type="text"/>	Price : <input type="text"/>	Yield : <input type="text"/>	Price : <input type="text"/>	Yield : <input type="text"/>	Price : <input type="text"/>
CROP 5 :	<input type="text"/>	Yield : <input type="text"/>	Price : <input type="text"/>	Yield : <input type="text"/>	Price : <input type="text"/>	Yield : <input type="text"/>	Price : <input type="text"/>
CROP 6 :	<input type="text"/>	Yield : <input type="text"/>	Price : <input type="text"/>	Yield : <input type="text"/>	Price : <input type="text"/>	Yield : <input type="text"/>	Price : <input type="text"/>

Generate Result



الخطوة 4: إدخال الأرقام في الخانات المخصصة وأترك باقي الخانات بالجدول كما هي فارغه . بعد إدخال البيانات اضغط على " Generate results لكي تظهر النتيجة .

EYAR1 EQUATION

www.elhawary.net/dr-nabil/EYAR1\_form.php

### RELAY INTERCROPPING SYSTEM

MU) : Money Unit  
AU) : Area Unit

RELAY INTERCROPPING DURATION :  DAYS

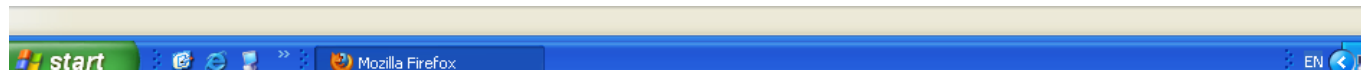
CROP SEQUENCE	COST/(AU) (MU)	MAIN PRODUCT (ARDAB/TON) (MU)		BY PRODUCT 1 (ARDAB/TON) (MU)		BY PRODUCT 2 (ARDAB/TON) (MU)	
		Yield	Price	Yield	Price	Yield	Price
CROP 1 :		3.18	1100	2.77	500		
CROP 2 :		8.3	850				
CROP 3 :							
CROP 4 :							
CROP 5 :							
CROP 6 :							
TOTAL COSTS :	4543						

### CROP SEQUENCE SYSTEM

SEQUENCE DURATION :  DAYS

CROP SEQUENCE	COST/(AU) (MU)	MAIN PRODUCT (ARDAB/TON) (MU)		BY PRODUCT 1 (ARDAB/TON) (MU)		BY PRODUCT 2 (ARDAB/TON) (MU)	
		Yield	Price	Yield	Price	Yield	Price
CROP 1 :	900	15	140				
CROP 2 :	2622	8.5	850				
CROP 3 :							
CROP 4 :							
CROP 5 :							
CROP 6 :							

EYAR1 (RELAY INTERCROPPING SYSTEM/CROP SEQUENCE SYSTEM) = 1.48 (48.037%)  
YIELD ADVANTAGE NET RETURN = 1592



الخطوه 5: عند الذهاب لمعادله اخرى ارجع الى الصفه الرئيسيه ثم اضغط على اسم المعادله وسوف تظهر صفحه المعادله .  
الخطوه 6: يمكن إتباع الخطوات السابقه لأستخدام أى من المعادلات الموجوده على الموقع .

#### References:

- 2-El-Hawary, N.A . 2009 : Formulas for relay intercropping and crop sequence systems evaluation . *J. Appl. Sci. Res.* 5(12) : 2074-2082 .
- 3-El-Hawary, N.A. 2011 : Formulas for economic evaluation of intercropping systems . "Economic evaluation from the perspective of crop intensification."Book ,128 pages. Publisher :LAP LAMPERT Academic Publishing , (August 22, 2011) ,Germany ..ISBN: 978-3-8454-0246-8 .