good results against *T. absoluta*. (Goncalves-Gervasio and Vendramin, 2007) recorded that, the entomopathogenic fungus *M. anisopliae* could be caused female's mortality up to37.14% and laboratory studies indicated *B. bassiana* could cause 68% larval mortality. The same findings obtained by Sabbour et al 2013, Sabbour, 2012, Sabbour and Abd El Raheem 2013.

Data in table 3 show when the effect of the three bacterial varieties *Bacillus thuringiensis Diple (2X), B.t kurstaki HD-73,* and *B.t kurstaki HD-234* .

In the field, results show that, after 50 day of the application the means number o infestations were scored significantly decreased to 11.17±12, 7.7±10.8, 18.2±11.2, individuals for the corresponding B.t as compared to 26.5±11.34 individuals in the control (Table 3).

After 90 days of the post applications of the bacterial varieties, the means number of infestations significantly decreased to 112.2±11.9 , 10.6±8.8, 15.2±10.7 as compared to30.6 ±10.8 individuals in the control . At the end of the experiment t120 days the corresponding mean number of the infestation 14.5±11.5, 1 1.4±13.5, 17.8±9.9 as compared to35.4±12.3 individuals (Table 3). The same results obtained by Sabbour 2009, Sabbour and abdelazizi2010. Sabbour and Abd El hakim2012 and Sabbour and AbdoU 2012.

*Bacillus thuringiensis* resulted fruit damage only 2 % in South America (Medeiros, et al., 2006). Entomopathogenic fungus *M. anisopliae* could be caused female's mortality up to 37.14%. Laboratory studies indicated *B. bassiana* could cause 68% larval mortality (Cabello et al., 2009). have shown an important reduction in the number of eggs of *T. absoluta*, between 92 and 96 %, when releasing 8 or 12 first stage nymphs of *Nabis pseudoferus* per plant (Cabello et al., 2009).Goncalves-Gervasio and Vendramin, 2007 and Cristina et al; 2008) recorded that, the entomopathogenic fungus *M. anisopliae* could be caused female's mortality up to37.14% and laboratory studies indicated *B. bassiana* could cause 68% larval mortality. The same results obtained by Sabbour 2003,(20014a&b), 2013.Magda Mahmoud Sabbour and Shadia El-Sayed Abd-El-Aziz. 2014, Magda Sabbour, 2001, Sabbour (2002 a &b), Magda Sabbour and Ismail2002, Sabbour and Sahab 2005 &2007, 20011.

Data in table 4 show that the weight of the tomatoes after the harvest scored the highly significance weight reached to 4916± 42.50, 4131± 34.33, 3123± 41.28, Kg/ feddan in the area treated with *Bacillus thuringiensis Diple (2X), B.t kurstaki HD-73, and B.t kurstaki HD-234*, respectively as compares to 2631± 36.80Kg/fesddan in the control in EL-Esraa farm (Nobaryia) during season 2013. El-Kassaseen (Ismailia) during season 2013, the corresponding treatmedts areas scored a highly yied recored to, 3718± 40.30, 3718± 40.30and 5879±69.33 Kg/ feddan as compared to 1881±80.54Kg/ feddan. The percentage of yield loss ranges between 15-46 in El-Esraa (Nobaryia) during season 2013 . The percentage of yield loss ranges between 15-64 in El-Kassaseen (Ismailia) during season 2013.

The same results obtained by Cabello et al., 2009; EPO, 2008, EPO 2009,a&b; Goncalves-Gervasio and Vendramin, 2007 and Cristina et al; 2008 Kennedy, G.G. 2003 Leite1999; Miranda2005; Angela 2008 and Medeiros, et al., 2006), Sabbour 2006, Sabbour and Abd el Aziz 2007, Sabbour, 2007, Sabbour and Abbas, 2007. Sabbour and Hany, 2007, Sabbour,2008. Asmaa et al 2009.

Tabe 5 show that in El-Esraa (Nobaryia) during season 2014 the weight of the tomatoes crop scored5997± 42.50, 5197± 35.35, and 3799± 39.41 Kg/ feddan after treated the tomatoes areas by *B.t kurstaki HD-73,, B.t kurstaki HD-234*, and *Bacillus thuringiensis Diple (2X)* as compared to 2062± 37.61 Kg/ feddan in the control the yield loss decreased to 13, and 36 as compared to 65 in the control. In El-Kassaseen (Ismailia) during season 2014 the corresponding areas treatments the yield weight robtained6290±60.41, 5701±64.21, 3998± 42.53, Kg/ feddan as compared to 2005±60.40 kg/ feddan in the control. The yield loss recorded were 9 and 36% as compared to 68% in the control (Table 5). Loss of the yield calculated by Sabbour & Shadia Abd El-Aziz, (2002 and 2010), Shadia Abdel Aziz & Nofel (1998), proved that applications with bioinsecticides increased the yield and decreased the infestations. Abdel-Rahman & Abdel-Mallek (2001), Abdel-Rahman (2001) and Abdel-Rahman & Abdel-Mallek (2001), controlled cereal aphids with entomopathogenic fungi. They found that the infestation was reduced after fungi applications under laboratory and field conditions. Sabbour & Sahab (2005, 2007 and 2011) found that the fungi reduced insect infestations of cabbage and tomato pests under laboratory and field conditions. These results agree with Sabbour & Shadia Abd El-Aziz, (2002 and 2010), proved that applications with bioinsecticides increased the yield and decreased the the infestation with insect pests.

### 3.1 The Economic feasibility of the use of bacteria on the tomato crop

Table (6) shows that the use of different types of bacteria and of B. t HD-1, B. t HD- 243, B. t HD-73 in each of the regions of the study resulted in increased productivity per acre by about 47% , 98% , 159% Nobaryia in area, as well as increased productivity per feddan by about 98% , 175% , 181% in Ismailia area, compared to the control for each of the types of bacteria, respectively. It also resulted in the use of different types of bacteria low percentage of lost harvest by 20% .32% and that for the type of bacteria B. t HD-1, while the decline amounted to around 42% .56% and that for the type of bacteria B. t HD- 243 in all from Nobaryia and Ismailia regions, respectively. As can be seen from the table that in the case of the universal use of different types of bacteria in the tomato worm resistance at the level of the republic will be the consequent increase in the production of the Republic by about 85% , 133% , 169% and that for each of the B. t HD-1, B. t HD- 243, HD-73 Bt, respectively, and also reduced the percentage of lost harvest to harvest tomatoes all over the country about 26% .49% when using each of the bacteria B. t HD-1, B. t HD- 243, respectively.

### 3.2 The Economic losses for the use of bacteria in the cultivation of tomato crop in the regions of the study and at the level of the Republic

To estimate the amount and value of the losses at the level of the regions of the study and dissemination of the republic requires that the experience of the use of bacteria in the reduction of the risk of tomato worm on the level of the governorates of Ismailia and Nobaryia then at the level of the Republic. Can be seen from Table (7) That the use of the type of bacteria B. t HD-1 resulted in a decrease in the amount of crop losses estimated at 7.36 tons, 15.02 thousand tons, 185.4 thousand tons, while the use of the type of bacteria B. t HD-2 consequent decline in the amount of losses estimated at 3.35 tons, 12.56 tons 0.351 thousand tons, Which will result in the devaluation losses estimated at 11.04 thousand pounds, 22.52 thousand pounds, 278.1 thousand pounds. About 5.03, 18.84,and 526.5 thousand pounds in each of Ismailia and Nobaryia Republic respectively.

## 4. Acknowledgment

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**Table 1:** Effect of microbial control agents against *Tuta absoluta under* laboratory conditions

| Microbial control agents | Lc50 Ug/ml | slope | variance | confidence limits |
|---|---|---|---|---|
| *Bacillus thuringiensis Diple (2X) B.t* | 140 | 0.01 | 1.59 | 246-200 |
| *HD-234* | 109. | 0.1 0 | 1.44 | 139-100 |
| *B.t HD-73* | 90. | 0.02 | 1.60 | 80-121 |

**Table 2:** Effect of microbial control agents against *Tuta absoluta* under green house effects

| Microbial control agents | Lc50 Ug/ml | slope | variance | confidence limits |
|---|---|---|---|---|
| *B.t kurataki*1 diple (2x) | 166 | 0.02 | 1.3 | 200-137 |
| *B.t HD_234* | 122 | 0.07 | 1.5 | 130-88 |
| *B.t HD-73* | 102 | 0.01 | 1.59 | 82-119 |

**Table 3:** Effect of the Bactria *B, t* three varieties under field conditions against *T. absoluta*

| Treatments / Days | Mean number of infestation ±SE | | |
|---|---|---|---|
| | 50 | 90 | 120 |
| *B.t HD_234* | 11.17±12. | 112.2±11.9 | 14.5±11.5 |
| *B.t HD-73* | 7.7±10.8 | 10.6±8.8 | 1 1.4±13.5 |
| *B.t kurataki*1 diple (2x) | 18.2±11.2 | 15.2±10.7 | 17.8±9.9 |
| Control | 26.5±11.34 | 30.6 ±10.8 | 35.4±12.3 |
| F value | 23.1 | | |
| Lsd5%= | 10.1 | | |

**Table 4:** Weight of harvested tomato and percentage of yield loss after treatment with the bacteria *B.t* , three varieties against the target insect pests during seasons 2013 in two different regions.

| Treatments | El-Esraa (Nobaryia) | | El-Kassaseen (Ismailia) | |
|---|---|---|---|---|
| | Weight tomatoes (Kg/feddan) | % yield loss | Weight tomatoes (Kg/feddan) | % yield loss |
| Control | 2631± 36.80 | 46 | 1881±80.54 | 68 |
| B. t HD-1diple (2x) | 3123± 41.28 | 36 | 3718± 40.30 | 36 |
| B. t HD- 243 | 4131± 34.33 | 15 | 4997±65.32 | 15 |
| B.t HD-73 | 4916± 42.50 | - | 5879±69.33 | - |
| F values | 31.20 | | 32.10 | |
| LSD 5% | 91 | | 90 | |

**Table 5:** Weight of harvested tomato and percentage of yield loss after treatment with the bacteria *B.t* , three varieties against the target insect pests during 2014 in two different regions .

| Treatments | El-Esraa (Nobaryia) | | El-Kassaseen (Ismailia) | |
|---|---|---|---|---|
| | Weight tomatoes (Kg/feddan) | % yield loss | Weight tomatoes (Kg/feddan) | % yield loss |
| Control | 2062± 37.61 | 65 | 2005±60.40 | 68 |
| B. t HD-1 | 3799± 39.41 | 36 | 3998± 42.53 | 36 |
| B. t HD- 243 | 5197± 35.35 | 13 | 5701±64.21 | 9 |
| B.t HD-73 | 5997± 42.50 | - | 6290±60.41 | - |
| F values | 31.02 | | 30.10 | |
| LSD 5% | 88 | | 86 | |

**Table 6:** Weight of harvested tomato and percentage of yield loss after treatment with the bacteria *B.t* , three varities against the target insect pests during The average period (2013- 2014 ) in two different regions .

| Treatments | El-Esraa (Nobaryia) | | El-Kassaseen (Ismailia) | | Average regions | |
|---|---|---|---|---|---|---|
| | Weight tomatoes (Kg/feddan) | % yield loss | Weight tomatoes (Kg/feddan) | % yield loss | Weight tomatoes (Kg/feddan) | % yield loss |
| Control | 2347 | 55.5 | 1943 | 68 | 2145 | 61.75 |
| B. t HD-1 | 3461 | 36.0 | 3858 | 36 | 3960 | 36 |
| B. t HD- 243 | 4664 | 14.0 | 5349 | 12 | 5007 | 13 |
| B.t HD-73 | 6085 | - | 5457 | - | 5771 | - |

Source :- Calculated and collected from two tables ( 4, 5 ) .

**Table 7:** estimate the amount and value of the losses before and after the use of bacteria in the regions of the study and at the level of the Republic Area thousand feddans, Productivity tons / feddans, Production thousand tons, Value thousand pound

| Type of bacteria | Region | Area | Productivity | Total output | losses before using bacteria | | losses after the use of bacteria | | Magnitude of the decline | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | quantity | *Value* | quantity | Value | quantity | Value |
| B. t HD-1 | Ismailia | 1 | 23 | 23 | 15.64 | 23.46 | 8.28 | 12.42 | 7.36 | 11.04 |
| | Nobaryia | 7 | 11 | 77 | 42.74 | 64.10 | 27.72 | 41.58 | 15.02 | 22.52 |
| | Republic | 48 | 15 | 720 | 444.6 | 666.9 | 259.2 | 388.8 | 185.4 | 278.1 |
| B. t HD-2 | Ismailia | 1 | 23 | 23 | 6.11 | 9.17 | 2.76 | 4.14 | 3.35 | 5.03 |
| | Nobaryia | 7 | 11 | 77 | 15.64 | 23.46 | 3.08 | 4.62 | 12.56 | 18.84 |
| | Republic | 48 | 15 | 720 | 444.6 | 666.9 | 93.60 | 140.40 | 351.00 | 526.5 |

Source: - calculated and collected from the table (5) and the annual publication of the agricultural economy in years 2012.2013.

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