

**FORECASTING THE CHANGES IN THE POPULATION
DENSITY OF THE POTATO TUBER MOTH
PTHORIMAEA OPERCULELLA(ZELLER)
IN RELATION TO PRE AND POST
HARVEST PARAMETERS**

BY

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ABSTRACT

Ghassan Ali Youssef. Forecasting the Changes in the Population Density of the Potato Tuber Moth *Phthorimaea operculella* (Zeller) in Relation to Pre and Post Harvest Parameters. Unpublished Ph.D. Dissertation, Department of Plant Protection, Faculty of Agriculture, Ain Shams University, Egypt, 2009.

This study was carried out on potato tuber moth *Ph. operculella* at the Insects Laboratory and the Experimental Agricultural Station of the Faculty of Agriculture at Shalakan, Qalyubia Governorate, Ain Shams University, during a period extending between 2005 and 2008, for establishing IPM control tactics for *Phthorimaea operculella* (Zeller).

The laboratory studies demonstrate the following: Nicola potato variety tubers harbored the least reproductive rates a combined with longest generation time and population doubling time (16.33eggs/female, 29.85 days, and 3.66 days), respectively. Potato tubers of Nicola variety had the lowest concentration of free phenols 19.507 ppm. Leaf moisture content had no effect on the insect preference to potato varieties. The optimum zone of temperature of 25, 27±2 and 30°C was the most favorable for potato tuber moth population activity and development.

Field experiments revealed that the highest numbers of captured moths were observed during summer months. The insect underwent nine distinct peaks thus representing nine overlapping generations. Nicola was the least susceptible than Atlas, Spunta and Simone varieties for potato tuber moth infestation. The infestation with potato tuber moth increased as rate of fertilization was decreased. Also as the gap period between final irrigation and harvest time was increased and as the period between harvest and handling tubers was increased.

Lunar phases affect significantly the fluctuations in the population density of potato tuber moth. The following two equations were achieved for predicting the expected changes in the population density expressed as

number of moths captured weekly using water sex pan pheromone traps for *Ph. operculella* male moths:

$$\hat{Y}_{1M} = \text{Exp} (-0.3392 + 1.0015 \times \sqrt{Ta})$$

$$\hat{Y}_{2M} = \text{Exp} (-0.7182 + 1.0927 \times \sqrt{Ta})$$

Action Threshold Level was estimated as 7.14 % infestation, causing reliable decrease in yield average of 7.5 %. Damage Threshold Level (DTL) was estimated as 11.90% and the corresponding decrease in yield was 12.56 %. Economic Injury Level (EIL) was estimated as 15.71% and the decrease in yield was equal to 16.58 %. When the following equation $C = V I P D$, was considered, it yielded losses equal to 19.05% as the highest infestation economic injury allover the potato growing season. Decrease in yield reached 20.1% or more in the fields not treated with pesticides.

Key words:

Potato tuber moth, Life table, Susceptibility of Potato varieties, Agricultural Practices, Metrological factors, Forecasting, Damage Loss, Population dynamics, Monitoring.

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CONTENTS

	Page
List of Tables	i
List of Figures	ix
I- INTRODUCTION.....	\
II- REVIEW OF LITERATURE.....	3
III- MATERIAL AND METHODES	36
IV- RESULTS AND DISCUSSIONS	47
1- The fluctuations in seasonal occurrence and population activity of potato tuber moth attacking potato crop, based on sex pheromone trap catches at Qalyubya Governorate	47
2- Number of annual field generations of potato tuber moth as determined by sex pheromone trap catches	48
3-Relative susceptibility of certain potato varieties to potato tuber moth, <i>Ph. operculella</i> infestations	53
3-1- PTM infestation on foliage of certain potato varieties	53
3-2- PTM infestation in tubers of certain potato varieties.....	57
3-3-Effect of moisture content (sap leaves) on the infestation with <i>Ph. operculella</i>	59
3-4- Free phenols content in relation with PTM infestation in certain potato varieties	62
3-5- Monitoring life table bio aspects for rearing <i>Ph. operculella</i> survivors on variable potato varieties	64
a- Survival and fecundity rates	64
b- Net reproductive rate (R_0)	70
c- Generation duration (Gt)	70
d- Intrinsic rate of increase (rm)	70
e- Finite rate of increase (λ)	70
f- Population doubling time (D.t.)	71
g- Natural mortality analysis	71
4- Simultaneous effect of certain thermal regimes on life table parameters of <i>Ph. operculella</i>	75
4-1- Age specific survivorship and fecundity	75
4-2- Life table parameters	83

a- Net reproductive rate (R_0)	83
b- Generation duration (G_t).....	83
c- Intrinsic rate of increase (r_m)	83
d- Finite rate of increase (λ)	83
e- Population doubling time (D.t.)	84
4-3- Natural mortality analysis	84
5- Effect of recommended cultural practices on the potato tuber moth infestations	90
5- 1-Impact of fertilization rates on infestation with PTM	90
5-1-1-Foliage infestation	90
5-1-2-Tuber infestation	93
5-2- Effect of gab period between last irrigation and potato yield on infestation levels of PTM	97
5-3- Effect of gap period between harvest and storing tubers on infestation with potato tuber moth	100
6- The effect of lunar phases on the fluctuations in the population density of potato tuber moths	103
7- Predicting the changes in the population density of PTM	108
7-1- Based on data figures and the corresponding weather factors	108
7-1-1- Actual data figures.....	110
7-1-1-1- Actual weekly number of moths (Y) and weekly figures of daily mean temperature (X)	110
7-1-1-2- Natural logarithm of weekly number of captured moths (LN Y) and the corresponding weekly average of daily mean temperature (X)	111
7-1-1-3-Natural logarithm of both moth numbers (LN Y) and temperature (LN X)	111
7-1-1-4- When square root of weekly moths numbers ($\sqrt{Y}$) and mean temperature (X) are considered	112
7-1-1-5- Natural logarithm of weekly number of captured moths (LN Y) and square root of mean temperature ($\sqrt{X}$)	112
7-1-1-6- When square root of both weekly moths numbers ($\sqrt{Y}$) and mean temperature ($\sqrt{X}$) are considered	113

7-1-1-7- Square root of weekly numbers of moths ($\sqrt{Y}$) and natural logarithm of weekly mean of temperature (LN X)	113
7-1-1-8- Observed weekly number of moths (Y) and natural logarithm of weekly mean temperature (LN X)	113
7-1-2- Using sorted data figures	114
7-1-2- 1- Actual weekly number of moths (Y) and weekly mean temperature (X)	114
7-1-2-2- Natural logarithm of weekly number of captured moths (LN Y) and the corresponding weekly average of daily mean temperature (X)	115
7-1-2-3- Natural logarithm of both moth numbers (LN Y) and temperature (LN X)	115
7-1-2-4- When square root of weekly moths numbers ($\sqrt{Y}$) and mean temperature (X) are considered	116
7-1-2-5- Natural logarithm of weekly number of captured moths (LN Y) and square root of mean temperature ($\sqrt{X}$)	116
7-1-2-6- When square root of both weekly moths numbers ($\sqrt{Y}$) and mean temperature ($\sqrt{X}$) are considered	116
7-1-2-7- Square root of weekly numbers of moths ($\sqrt{Y}$) and natural logarithm of weekly mean of temperature (LN X)	117
7-1-2-8- Observed weekly number of moths (Y) and natural logarithm of weekly mean temperature (Log X)	117
7-2- Forecasting <i>Ph. operculella</i> population trend based on day-degrees during 2007 season	119
7-2-1- Actual data figures	120
7-2-1-1- Actual weekly number of moths (Y) and weekly mean figures of both maximum (X_1) and minimum temperature (X_2) ...	122
7-2-1-2- Actual weekly number of moths (Y) and weekly mean of degree-days (X)	123
7-2-2- Using sorted data figures	123
7-2-2-1- Actual weekly number of moths (Y) and weekly mean figures of both maximum (X_1) and minimum temperature (X_2) ...	124
7-2-2-2- Actual weekly number of moths (Y) and weekly mean of degree days (X)	124

8- Damage loss assessment based on potato tuber moth infestations	125
a- Season 2006	126
i) Adopting actual data figures (non sorted data)	126
ii) Adopting sorted data.....	130
1- Sorted weight data figures (Y) and the corresponding sorted yield losses (X_1)	130
2- Sorted yield weight data (Y) and the corresponding sorted total number of holes/plant (X_2)	132
3- Sorted yield weight data (Y) and the corresponding sorted number of larvae (X_3)	132
b - Season 2007	138
a) Based on actual data figures	140
b) Considering sorted data figures.....	142
1- Sorted weight data figures (Y) and the corresponding sorted yield losses (X_1)	143
2- Sorted yield weight data (Y) and the corresponding sorted total number of holes/plant (X_2)	143
3- Sorted yield weight data (Y) and the corresponding sorted number of larvae (X_3)	145
c – Average of 2006 & 2007 season	150
i- Considering actual data	151
ii- Using sorted data figures	151
1- Sorted weight yield figures (Y) and sorted losses (X)	152
2- Sorted weight data figures (Y) and sorted total number of holes (X) per plant	153
3- Sorted weight data (Y) and sorted collected number of larvae (X)	154
V-SUMMARY	159
VI-REFERENCES	168
VII-ARABIC SUMMARY	

LIST OF FIGURES

Fig	Title	Page
Fig. (1):	Fluctuations in the population density of PTM as determined by water pan sex pheromone trap during 2006 & 2007	50
Fig. (2):	Mean number of <i>Ph. operculella</i> larvae infestations on four potato varieties during summer seasons of 2006 and 2007...	56
Fig. (3):	The fluctuations in the age-specific survival rates (Lx) of <i>Ph. operculella</i> adult females reared at different constant temperatures	82
Fig. (4):	Age-specific fecundity rate (Mx) of <i>Ph. operculella</i> adult females at different constant temperatures	82
Fig. (5):	Percentage of larval content in leaflets as affected by fertilization rates during 2006 & 2007 summer seasons.....	94
Fig. (6):	Percentage of infested potato tubers as affected by fertilization rates during 2006 & 2007 summer seasons.....	95
Fig. (7):	Percentage of larval content in tubers as affected by fertilization rates during 2006 & 2007 summer seasons	95
Fig. (8):	Percentage of infested potato tubers as affected by period between final irrigation and harvest time during 2006 & 2007 summer seasons	99
Fig. (9):	Percentage of larval content in tubers as affected by period between final irrigation and harvest time during 2006 & 2007 summer seasons	100
Fig. (10):	Percentage of infested potato tubers as affected by period between harvest and removing tubers to stores during 2006 & 2007 summer season.....	102
Fig. (11):	Percentage of larval content in tubers as affected by period between harvest and removing tubers to stores during 2006 & 2007 summer season	102
Fig. (12):	Number of weekly captured moths for each of the 4 moon phases for complete year of 2007 at Qalyubiya Governorate	106
Fig. (13):	The relation between the effect of changes of four quarter phases of moon and the population density of potato tuber moth	106

Fig. (14):The relationship between actual and estimated potato yield using losses in Atlas variety, season 2006 at Qalyubya Governorate	131
Fig. (15):The relationship between actual and estimated potato yield using No. of holes in Atlas variety, season 2006 at Qalyubya Governorate	133
Fig. (16):The relationship between actual and estimated potato yield using larval content in Atlas variety, season 2006 at Qalyubya Governorate	134
Fig. (17):The relationship between actual and estimated potato yield using losses in Atlas variety, season 2007 at Qalyubya Governorate	144
Fig. (18):The relationship between actual and estimated potato yield using No. of holes in Atlas variety, season 2007 at Qalyubya Governorate	145
Fig. (19):The relationship between actual and estimated potato yield using larval content in Atlas variety, season 2007 at Qalyubya Governorate	146
Fig. (20):The relationship between actual and estimated potato yield using loses as an average of 2006 & 2007 seasons at Qalyubiya Governorate.....	152
Fig. (21):The relationship between actual and estimated potato yield using number of holes as an average of 2006 & 2007 seasons at Qalyubiya Governorate	153
Fig. (22):The relationship between actual and estimated potato yield using number of holes as an average of 2006 & 2007 seasons at Qalubiya Governorate	155

LIST OF TABLES

Table	Title	Page
Table (1):	Age specific life tables data figures expressed as definitions and corresponded formula	39
Table (2):	Fluctuations in collected of <i>Ph. operculella</i> moths by water pan sex pheromone trap at Qalyubiya, during 2006 & 2007	49
Table (3):	The approximated number and duration of potato tuber moth generations based on the weekly number of captured male moths at Qalyubia Governorate during of 2006 & 2007	52
Table (4):	Larval infestation rate of <i>Ph. operculella</i> on four potato varieties during summer plantations of 2006 and 2007 at Qalyubiya Governorate	55
Table (5):	<i>Ph. operculella</i> infestation expressed as percentage of infested potato tubers by larvae number in 100 tubers in four varieties during summer plantations of 2006 and 2007 (Qalyubiya Governorate).....	58
Table (6):	Correlation between larval and moisture content of different potato varieties leaves during summer plantation 2006	60
Table (7):	Correlation between larval and moisture content of different potato varieties leaves during summer plantation 2007	61
Table (8):	Free phenols content (ppm.) in relation with PTM infestation in potato tubers of four tested varieties during 2007 season	64
Table (9):	Life table parameters expressed as numbers of survivors (Lx) and fecundity rates (Mx) of <i>Ph. operculella</i> when larvae were fed on potato tubers variety Atlas for one generation.....	66
Table(10):	Life table parameters expressed as numbers of survivors (Lx) and fecundity rates (Mx) of <i>Ph. operculella</i> when larvae were fed on potato tubers variety Spunta for one generation	67

Table(11): Life table parameters expressed as numbers of survivors (Lx) fecundity rates (Mx) of <i>Ph. operculella</i> when larvae were fed on potato tubers variety Simone for one generation	68
Table(12): Life table parameters expressed as number of survivors (Lx) fecundity rates (Mx) of <i>Ph. operculella</i> when larvae were fed on potato tubers variety Nicola for the fall generation.....	69
Table (13): Life table parameters of <i>Ph. operculella</i> larvae reared on four potato varieties	71
Table (14): Changes in natural mortality parameters of potato tuber moth when larvae were fed on tubers of Atlas variety	72
Table (15): Changes in natural mortality parameters of potato tuber moth when larvae were fed on tubers of Simone variety	73
Table (16): Changes in natural mortality parameters of potato tuber moth when larvae were fed on tubers of Spunta variety	73
Table (17): Changes in natural mortality parameters of potato tuber moth when larvae were fed on tubers of Nicola variety	74
Table (18): Life table parameters as survivors (Lx) and fecundity rates (Mx) of <i>Ph. operculella</i> at 27±2°C.	76
Table (19): Life table parameters as survivors (Lx) and fecundity rates (Mx) of <i>Ph. operculella</i> at 15°C.	77
Table (20): Life table parameters as survivors (Lx) and fecundity rates (Mx) of <i>Ph. operculella</i> at 20°C	78
Table (21): Life table parameters as survivors (Lx) and fecundity rates (Mx) of <i>Ph. operculella</i> at 25°C	79
Table (22): Life table parameters as survivors (Lx) and fecundity rates (Mx) of <i>Ph. operculella</i> at 30°C. ...	80
Table (23): Life table parameters as survivors (Lx) and fecundity rates (Mx) of <i>Ph. operculella</i> at 35°C.....	81
Table (24): The impact of different constant temperatures on life table parameters of <i>Ph. operculella</i>	85