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EFFECT OF SOME BIOTIC FACTORS, BIOTIC FACTORS AND SOME MATERIALS ON THE MITE, *TETRANYCHUS URTICAE* KOCH ON SOYBEAN AT QALUBIYA GOVERNORATE

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ABSTRACT

Experiments were conducted at Benha, Qalubiya Governorate on soybean plants during 2005 and 2006 seasons to study the population fluctuation of the two spotted spider mite, *Tetranychus urticae* Koch in relation to common associated predators (*Coccinella undecimpunctata* L. and *Orius albidipennis* Reut) and some prevailing climatic factors (daily mean temperature and daily mean relative humidity). As well the effect of some materials against *T. urticae* during two seasons. The obtained data indicated the following:

1. The population of *T. urticae* reached its maximum on July 5th, showing 484.8 individuals/30 leaves during 2005 season, while during season 2006 the maximum level occurred on July 31st (488.5 individuals/30 leaves)
2. The combined effect of the weekly mean of predator's population, daily mean temperature and daily mean relative humidity was responsible for 87.7 and 81.5% of changes in the population of *T. urticae* during two seasons, respectively.
3. The various materials were found to be very effective for controlling of *T. urticae* was as followings during 2005 and 2006 seasons:
   Selecron > Super Masrona > Nat 1> Biofly.

INTRODUCTION

Soybean, *Glycine max* (L.) Merri. represents one of the most important cache crops in many countries. It is considered one of the summer legume crops; with great nutritive value, containing relatively high percentage of oil and proteins contains many essential amino acids (Badenhop and Hacker, 1971).

The two spotted spider mite, *Tetranychus urticae* Koch is one of the major insects, which attack this crop in the fields causing severe damage (El-Kifl *et al.*, 1974; Hamed, 1977; Awadalla *et al.*, 1991).

Thus, the present work was conducted to study the population fluctuation of *T. urticae* and their relation to common associated predators and some prevailing climatic factors during two successive growing seasons. Also, evaluation of certain material treatments against the two spotted spider mite, *Tetranychus urticae* on soybean plants.

MATERIALS AND METHODS

Experiments were carried out at Benha, Qalubiya Governorate during the two successive seasons of 2005 and 2006. An area of ½ Feddan was cultivated by soybean seeds [*Glycine max* (L.) Merri.] variety "Giza 111" on April 23rd and May 5th during the two seasons, respectively The area was divided four equal plots. The plants were received for all normal recommended agricultural practices of soybean. Samples were picked, put in

a paper bags and examined *T. urticae* and predators started after about 10 days from sowing and continued until the end of the season. Weekly recorded the two spotted mite, *Tetranychus urticae* Koch "adult and immature stages", the predator, eleven-spotted lady bird beetle, *Coccinella undecimpunctata* L. "adults, larvae and pupae" and the predator flower bugs, *Orius albidipennis* (Reut) "nymphs".

The record of meteorological data, the daily mean of temperature and daily mean relative humidity, were obtained from the metrological records of Central Laboratory for Agriculture Climate, Agriculture Research Center, Dokki (preventive Shebien El-Qanater).

- Chemical materials tested:

1. The mineral oil, Super Mesrona 94% EC, produced by Misr Petroleum Company, at rate of 2 and 1 liter/100 L. water.
2. The plant oil, Jojoba oil (Nat1 96%), *Simmondsia chinensis* (Link), produced by the Egyptian Company for natural oils, at rate of 2 and 1 liter/100 L. water.
3. The bioinsecticides, *Beauveria bassiana* (Biofly), ($3X10^7$ conidia/ml), produced by El-Nasr for fertilizers and chemicals company, at rate of 200 and 100 ml/100 L. water.
4. The Organophosphorous compound, Profenofos (Selecron 72% EC), produced by Novartis Company, Switzerland, at rate of 187.5 cm^3/100 L. water.

Soybean plants were treated three times, on July 8th and July 14th during 2005 and 2006 seasons. Inspection was done before and after spraying with 1, 3, 7 and 14 days and repeated twice after two weeks intervals.

- Statistical analysis:

By using computer software package "Costat" a product of Chohort Software, Inc., Barkley, California, USA and Henderson and Telton (1955).

RESULTS AND DISCUSSION

1.1. The population of *Tetranychus urticae* Koch:

The data in Figs (1 & 2) showed that, the mean number of *T. urticae* recorded zero & 14.5 individulas/30 leaves at the second inspection on May 10th and May 22nd during 2005 and 2006 seasons, respectively, then increased gradually and fluctuated to reach its maximum (484.8 & 488.5 individulas/30 leaves) on July 5th and July 31st during the two seasons, respectively, after that, the populations decreased gradually to reach 114.5 & 83.00 individulas/30 leaves at the end of inspection on August 16th and August 28th during 2005 and 2006 seasons, respectively.

Generally, results of 2005 and 2006 seasons showed that the incidence of soybean infestation by *T. urticae* as expressed as a mean number of adults and immature stages was increased gradually and fluctuated in increase way with the increase of soybean plant age to reach its maximum on July 5th and July 31st during the two successive tested seasons, respectively, then the infestation was dropped gradually to reach the minimum rate at plant ages. It can be concluded that goung soft plants have

the highest biological activities with incidence of *T. urticae* infestation. Similar results for times and attack by *T. urticae* were obtained by *et al.* (1990); Sawires *et al.* (1990); Rizk and Zandigiacomo 91992).

1.2. The population of the predator, *Coccinella undecimpunctata* L.:

As presented in Figs (1 & 2), the mean number of *C. undecimpunctata* recorded on the first inspection were (zero & 1.5 individulas/30 leaves) on May 3rd and May 15th during 2005 and 2006 seasons, respectively, then fluctuated in increase way to reach its maximum (75.5 & 73.8 individulas/30 leaves) on July 12th and July 31st, respectively. Also, the population decreased gradually to reach (20.3 & zero individulas/30 leaves) at the end of the two seasons on August 16th and August 28th, respectively.

Generally, results of the two seasons indicated that, the predator, *C. undecimpunctata* population of the prey and decreased with the decrease of prey population. These results were in agreement with that obtained by El-Khouly *et al.* (1998) and Ghattas (1999).

1.3. The population of predator, *Orius albidipennis* Reut:

Data in Figs (1 & 2), revealed that, the mean number of *O. albidipennis* nymphs per 30 leaves recorded zero & 4.5 nymphs by second sample during 2005 and 2006 seasons, respectively, then the insect population increased gradually and fluctuated to reach the maximum average by 81.3 & 55.0 nymphs/30 leaves on June 28th and July 17th during 2005 and 2006 seasons, respectively, after that the population decreased gradually by the time laps to recorded 17.0 & 23.3 nymphs/30 leaves on August 16th and August 28th, respectively. Results agreed with Song *et al.* (1997) and Kim *et al.* (2001).

2.1. Effect of two biotic factors (predators) on the population fluctuation of *Tetranychus urticae:*

The results indicated that there was a significant positive correlation between the two species of predators *(C. undecimpunctata* and *O. albidipennis)* on *T. urticae* population during the two successive seasons, (r = 0.935 & 0.931) for the two species of predators, respectively) and (r = 0.851 & 0.735) during 2005 and 2006 seasons, respectively. The partial regression analysis for the effect of predators on *T. urticae* population revealed that there were significant positive effect (b. reg. = 4.7 & 5.1 for the two species of predators, respectively) and (b. reg. = 3.7 & 8.1) during 2005 and 2006 seasons, respectively, (Tables, 1 & 2).

2.2. Effect of two abiotic factors on the population fluctuation of *Tetranychus urticae:*

The results indicated that there was a significant positive correlation between the daily mean temperatures on *T. urticae* population during the two successive seasons, (r = 0.634 & 0.551) during 2005 and 2006 seasons, respectively, while insignificant positive correlation was noticed between the daily mean relative humidity on *T. urticae* population during the two successive seasons (r = 0.211 & 0.112) during 2005 and 2006 seasons, respectively, in (Tables, 1 &2).

Table (1): Effect of two biotic and abiotic factors on population fluctuation of *Tetranychus urticae* on soybean plants during 2005 season at Qalubiya Governorate.

Factors		Simple correlation and regression values				Partial regression values				Analysis of variance		EV%
		r	b	S.E.	T	b.reg.	S.E.	T	P	F	P	
Biotic factors (predators	*Coccinella undecimpunctata*	0.935	2.8	1.4	9.8	4.7	1.4	2.9	0.05	27.8	0.00	87.7
	Orius albidipennis	0.931	3.2	1.6	9.5	5.1	1.5	2.8	0.05			
Abiotic factors	Daily mean temp.	0.634	-2.7	1.3	3.1	-2.6	1.2	-1.8	0.1			
	Daily mean RH	0.211	1.9	0.14	0.8	3.7	1.0	0.37	0.7			

r = Simple correlation value Tabulated T = 2.18
b = Simple regression coefficient value
b.reg. = Partial regression coefficient value

Table (2): Effect of two biotic and abiotic factors on population fluctuation of *Tetranychus urticae* on soybean plants during 2006 season at Qalubiya Governorate.

Factors		Simple correlation and regression values				Partial regression values				Analysis of variance		EV%
		r	b	S.E.	T	b.reg.	S.E.	T	P	F	P	
Biotic factors (predators	*Coccinella undecimpunctata*	0.851	2.3	0.8	6.1	3.7	1.6	2.2	0.05	23.6	0.00	81.5
	Orius albidipennis	0.735	2.8	1.1	4.1	8.1	1.5	2.9	0.04			
Abiotic factors	Daily mean temp.	0.551	-2.2	0.9	2.5	-5.4	1.4	-1.3	0.1			
	Daily mean RH	0.112	1.3	0.21	0.4	2.1	0.7	0.36	0.4			

r = Simple correlation value Tabulated T = 2.18
b = Simple regression coefficient value
b.reg. = Partial regression coefficient value

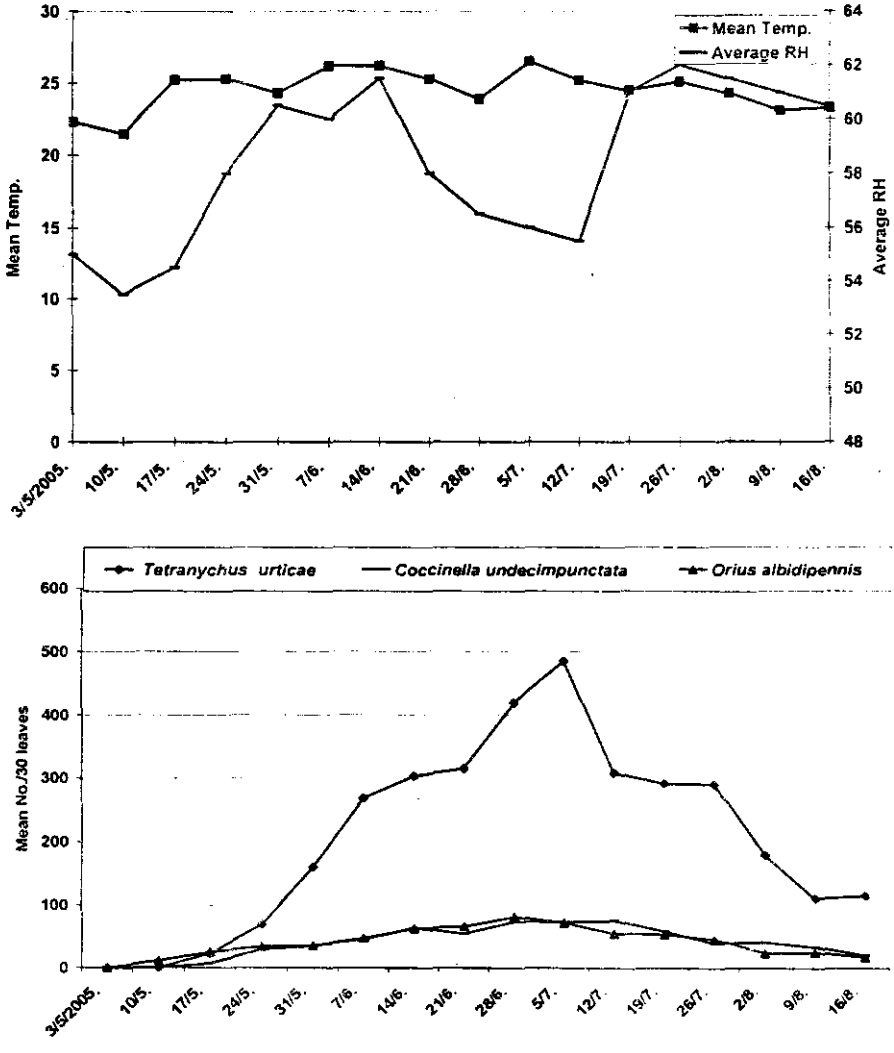

Fig. (1): Population fluctuations of *Tetranychus urticae* Koch and two predators (*Coccinella undecimpunctata* L. and *Orius albidipennis* Reut) on soybean plants during 2005 at Qalubiya Governorate, climatic factors.

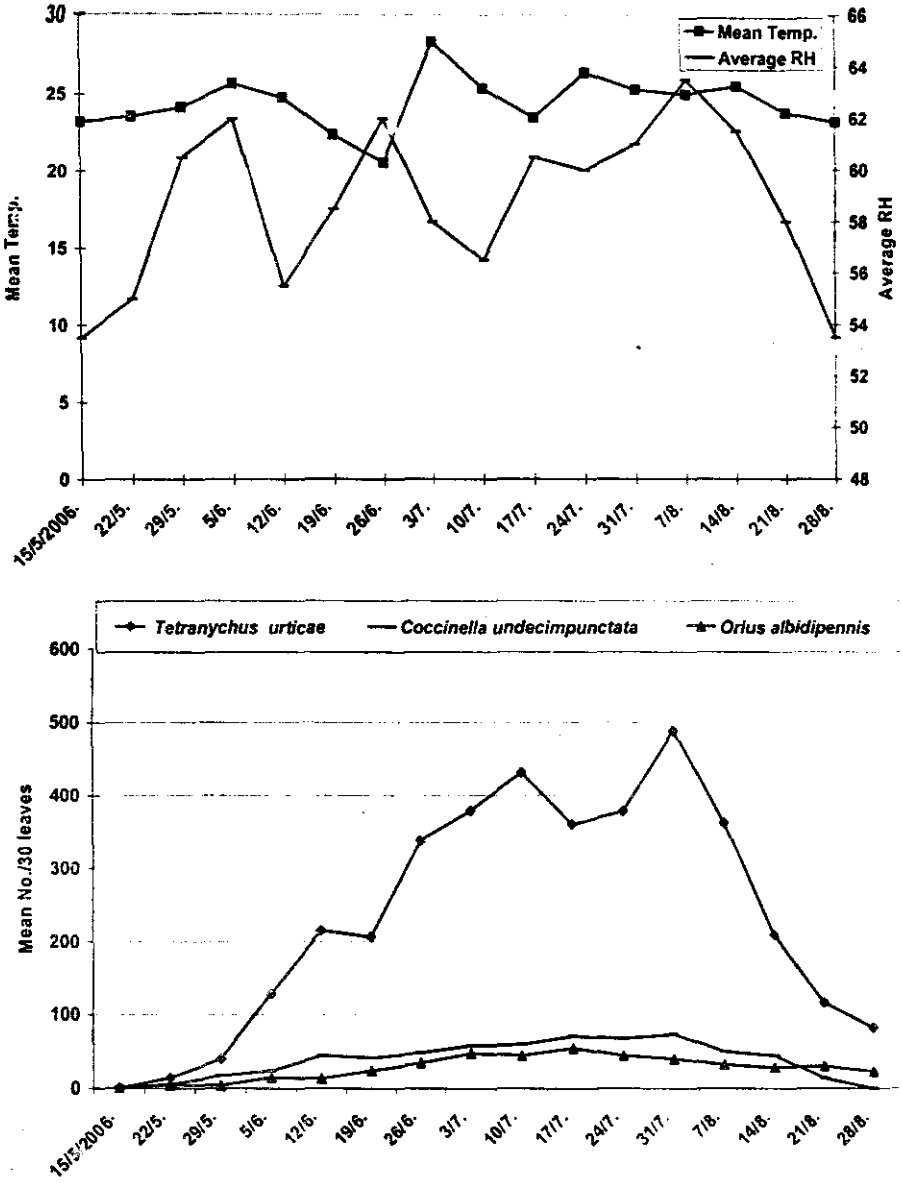

Fig. (2): **Population fluctuations of *Tetranychus urticae* Koch and two predators (*Coccinella undecimpunctata* L. and *Orius albidipennis* Reut) on soybean plants during 2006 at Qalubiya Governorate, climatic factors.**

The partial regression analysis for the effect of biotic factors on *T. urticae* population revealed insignificant negative effect between daily mean temperature on *T. urticae* population (b. reg. = -2.6 & -5.4) the two successive seasons during 2005 and 2006 seasons, respectively, while insignificant positive effect between daily mean relative humidity on *T. urticae* population (b. reg. = 3.7 & 2.1)during the two successive seasons 2005 and 2006 seasons, respectively in (Tables, 1 &2).

2.3. The combined effect of two biotic and abiotic factors on the population fluctuation of *Tetranychus urticae:*

The obtained results revealed significant effect of the combined effect of biotic and abiotic factors on *T. urticae* activity during the two successive seasons, where the calculated "F" values were 27.8 and 23.6 during 2005 and 2006 seasons, respectively.

The amount of variability that could be attributed to the combined effect of biotic and abiotic factors on *T. urticae* population was 87.7 and 81.5% during 2005 and 2006 seasons, respectively (Tables, 1&2). In other words, the tested factors, predators and weather factors showed and tested are significantly responsible for about 87.7 and 81.5 of the changing of population density or insect catch during the both investigated seasons of 2005 and 2006, respectively. Results agreed with El-Khouly *et al.* (1998).

3. Evaluation of some materials against *Tetranychus urticae* on soybean:

Data in Table (3&4) showed that the results of average reduction rate of *T. urticae* individuals were 69.1 & 62.6% for Super Masrona at 2.0 & 1.0 L/100 L. water, respectively. 68.4 & 62.3% for Nat1 (Jojoba oil) at 2.0 and 1.0 L/100 L. water, respectively, 60.1 & 45.4% for Biofly at 200 & 100 cm^3/100 L. water, respectively and 73.0% for Selecron at 187.5 Cm^3/100 L. water during 2005 season, while there were (69.7 & 64.2%), (68.7 & 60.8%), (56.0 & 47.0%) and (71.3%) for the 4 compounds, respectively during 2006 season. Values of the general mean of individuals revealed significant reduction for various treatments at different concentration compared with the control during the two seasons, the data indicated that, no significant differences in general mean of individuals between high and low concentrations of Super Masrona, Nat1 and Biofly during 2005 and 2006 seasons except for Biofly during 2005, where the high concentration was more effective against *T. urticae* individuals.

Generally, results of 2005 and 2006 seasons revealed that, all treatments caused reduction of *T. urticae* individual's population. The tested compounds were arranged in descending order as follows: Selecron, Super Masrona, Nat 1, and Biofly. The same results were obtained by El-Adawy *et al.* (1995), also Omar and El-Khateeb (2002).

Table (3): Effect of various treatments against *Tetranychus urticae* Koch adults and immature stages infesting soybean plants during 2005 season at Qalubiya Governorate.

Treatments	Rate/100 liters water	Mean number and %reduction/3 sprays					
		Average No. of individuals/30 leaves and percent reduction at indicated periods (days)					
		Pre-spray	1	3	7	14	Average
Super Masrona (mineral oil)	2.0	61.5	13.3 (76.9)	7.5 (86.2)	14.3 (74.2)	31.3 (38.9)	16.6 (69.1)
	1.0	55.0	14.0 (72.8)	10.8 (77.8)	14.0 (71.8)	33.0 (28.0)	18.0 (62.6)
Nat 1 (Jojoba oil)	2.0	72.3	17.0 (74.8)	9.5 (85.2)	15.8 (75.7)	37.5 (37.8)	20.0 (68.4)
	1.0	75.0	18.5 (73.6)	10.8 (65.6)	19.5 (71.1)	38.3 (38.7)	21.8 (62.3)
Biofly *(Beauveria bassiana)*	200 cm^3	66.5	28.3 (54.5)	12.8 (78.3)	16.5 (72.5)	36.0 (35.0)	23.4 (60.1)
	100 cm^3	81.8	43.0 (43.8)	28.5 (60.6)	36.0 (51.1)	50.3 (26.2)	39.5 (45.4)
Selecron (profenofos)	187.8 cm^3	66.5	13.5 (78.3)	7.3 (87.6)	10.8 (82.0)	31.0 (44.1)	15.7 (73.0)
Control	-	81.5	75.5	72.0	73.5	68.5	72.4

LSD at 5% p = 8.7 * = Significant at 5% level ( ) = Reduction rates are given in brackets

Table (4): Effect of various treatments against *Tetranychus urticae* Koch adults and immature stages infesting soybean plants during 2006 season at Qalubiya Governorate.

Treatments	Rate/100 liters water	Mean number and %reduction/3 sprays					
		Average No. of individuals/30 leaves and percent reduction at indicated periods (days)					
		Pre-spray	1	3	7	14	Average
Super Masrona (mineral oil)	2.0	49.5	10.5 (79.2)	6.3 (88.2)	15.0 (73.0)	36.8 (38.3)	17.2 (69.7)
	1.0	44.8	13.8 (69.8)	9.5 (80.3)	15.3 (69.6)	34.0 (37.0)	18.2 (64.2)
Nat 1 (Jojoba oil)	2.0	51.3	12.0 (77.1)	9.3 (83.1)	14.8 (74.3)	37.0 (40.1)	18.3 (68.7)
	1.0	64.0	20.5 (68.6)	20.8 (69.8)	21.5 (70.1)	50.5 (34.5)	28.3 (60.8)
Biofly *(Beauveria bassiana)*	200 cm^3	58.3	29.5 (50.4)	16.8 (73.2)	20.0 (69.5)	48.3 (31.2)	28.7 (56.0)
	100 cm^3	54.0	31.8 (42.3)	22.5 (61.3)	28.3 (53.4)	45.0 (30.8)	31.9 (47.0)
Selecron (profenofos)	187.8 cm^3	58.5	11.8 (80.2)	9.5 (84.9)	15.5 (76.4)	40.0 (43.5)	19.2 (71.3)
Control	-	68.8	70.5	74.0	77.3	83.0	76.2

LSD at 5% p = 11.8 * = Significant at 5% level ( ) = Reduction rates are given in brackets

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تأثيربعض العوامل الحيوية والغير حيوية وكذلك فاعلية بعض المواد ضد أكاروس العنكبوت الأحمر علي محصول فول الصويا في محافظة القليوبية

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أجريت هذه التجربة في مركز بنها – محافظة القليوبية لدراسة التقلبات العددية لأكاروس العنكبوت الأحمر علي محصول فول الصويا وعلاقتها بالمفترسات المصاحبة (أبو العيد ذو الإحدي عشر نقطة – بقة الأوريس) والعوامل الجوية السائدة (الحرارة – الرطوبة النسبية) بالإضافة الي دراسة تأثير بعض المواد الحديثة ضد أكاروس العنكبوت الأحمر خلال موسمي ٢٠٠٥، ٢٠٠٦م وأسفرت النتائج المتحصل عليها علي ما يلي:

١. سجل التعداد الكلي لأكاروس العنكبوت الأحمر أعلي معدل له في ٧/٥ بمتوسط ٣٠/٤٨٤,٨ ورقة خلال الموسم ٢٠٠٥، أما في الموسم ٢٠٠٦ منذ سجل التعداد الكلي لأفراد الأكاروس أعلي معدل له في ٧/٣١ بمتوسط ٣٠/٤٨٨,٥ ورقة.
٢. كان التأثير المشترك لكل من المتوسط الأسبوعي لتعداد المفترسات (أبو العيد ذو الإحدي عشر نقطة – بقة الأوريس) بالإضافة الي المتوسط اليومي لدرجة الحرارة والمتوسط اليومس للرطوبة النسبية مسئولا عن ٨٧,٧%، ٨١,٥% من التغيرات في تعداد أكاروس العنكبوت الحمر خلال الموسمين ٢٠٠٥، ٢٠٠٦ علي الترتيب.
٣. أظهرت المقاد المستخدمة لمكافحة الأكاروس فعالية عالية ويمكن ترتيب المواد المستخدمة تنازليا كبقا لكفاءتها في خفض التعداد خلال الموسمين كما يلي: سيليكرون > سوبر مصرونا > ناتا ١> بيوفلاي.