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Research Article

Life table parameters of the predatory mite *Neoseiulus californicus* (McGregor) on different strawberry cultivars in the laboratory conditions

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Abstract: *Neoseiulus californicus* (McGregor) is a predatory mite that can control spider mites. The effect of seven strawberry cultivars (including: 'Marak', 'Yalova', 'Aliso', 'Gaviota', 'Sequoia', 'Camarosa' and 'Chandler') on the growth and development of *N. californicus* was studied in the laboratory conditions (27 ± 1 °C, 70 ± 5% RH and 16L: 8D photoperiod). There was significant difference in the number of trichomes on the leaves of strawberry cultivars. Life table parameters were analyzed based on age stage, two sex life table. Egg incubation and protonymphal duration were significantly different when the predator was reared on different cultivars. There was no significant difference of total longevity among different cultivars. The longest preoviposition period was observed on 'Aliso' (1.70 days). The fecundity rate on 'Gaviota' and 'Sequioa' (6.90 and 8.91 eggs, respectively) was lower than other cultivars tested. The highest intrinsic rate of increase (0.20 day^{-1}) and fecundity rates (13.29 eggs) were on 'Chandler', which might be due to the higher nutritional quality of *Tetranychus urticae* Koch reared on it or its low density of trichomes. Among the seven strawberry cultivars 'Sequoia', 'Gaviota' and 'Yalova' were recognized unsuitable for development and reproduction of *N. californicus.*

Keywords: Life table parameters, *Neoseiulus californicus*, Strawberry Cultivars, Trichome

Introduction

Neoseiulus californicus (McGregor) (Acari: Phytoseiidae) is one of the main natural enemies of spider mites (Greco *et al.*, 2005; Gerson and Weintraub, 2007), feeding on all stages of *Tetranychus urticae* Koch, and other pest mites, small insects, and even plant pollen (McMurtry, 1997; Castagnoli *et al.*, 1999 b; Ragusa *et al.*, 2009). This predatory mite can decrease spider mite population below economic threshold in the greenhouse and field, *e. g.* on gerbera (Schausberger and Walzer, 2001), strawberry (Sato *et al.*, 2007), sweet pepper (Weintraub and Palevsky, 2008), cucumber (Alzoubi and Cobanoglu, 2010); clementin (Abad-Moyano *et al.*, 2010), apple (Pringle and Heunis, 2006), and citrus (Katayama *et al.*, 2006).

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Leaf surface of host plants can effect the development and reproduction of the predatory mites through providing refuge (Roda *et al*., 2001), protecting against abiotic factors (Norton *et al*., 2001) and providing pollen and fungal spores (Roda *et al*., 2003). Trichomes act as a barrier to the plant surface increasing the plant□s defense against herbivores. In addion to trichomes, some leaves also have domatia, which are pits, pouches, pockets or tufts (clusters of trichomes) found on the underside of the leaf at the junction of vein (Southwood, 1986). Leaves with pubescence and domatia often harbour more phytoseiid species (Walter, 1996). Some phytoseiid mites prefer plants with trichome or domatia-rich leaves (Walter, 1996; Duso and Vettorazzo, 1999). Although, some phytoseiid mites select trichome-rich leaves to lay eggs (Overmeer and van Zon, 1984; Roda *et al*., 2001), other studies showed that phytoseiid mites prefer glabrous leaves for oviposition (Finke and Denno, 2002; Kreiter *et al*., 2002). Many phytoseiid species are most common on plants with hairy leaves (Walter, 1996).

Biological parameters of phytoseiid mites such as developmental time, survival rate, reproduction and longevity may vary in response to the host plant (Gnanvossou *et al*., 2005). Some researchers reported that the number of prey consumed by the predatory mites were inversely related to trichome density (Krips *et al*., 1999)

No detailed study on the suitability of different strawberry cultivars for *N. callifornicus* has yet been conducted. Determining the biological parameters of this predator can be used to manage *T. urticae* populations on strawberry plant. Therefore, the aim of this study was to focus on the effect of strawberry cultivars on the performance of the predatory mite *N. californicus* to control *T. urticae* by determining the demographic parameters of this predator on *T. urticae* reared on different cultivars.

Materials and Methods

Host plants

Seven strawberry cultivars (including: ‘Mark’, ‘Yalova’, ‘Aliso’, ‘Gaviota’, ‘Sequoia’, ‘Camarosa’ and ‘Chandler’) were obtained from the University of Tehran (Karaj, Alborz). Crowns were stored at 1-4 °C for three weeks, then planted in a greenhouse (day: 25 ± 3 °C, night: 15± 5 °C, 65 ± 5% RH). The pots were irrigated daily and fertilized with NPK (20:20:20) once per two weeks.

Mite colony

Prey rearing

The stock culture of *T. urticae* was maintained on common beans (*Phaseolus vulgaris* L.) in a growth chamber (27 ± 1 °C, 70 ± 5 RH and 16: 8 hours L: D). The excised leaflets of strawberry cultivars (2 × 2 cm^2) was placed upside down on water saturated cotton balls and all developmental stages of *T. urticae* were maintained on leaflets for three generations. The spider mites reared on each cultivar were used in the experiments of the corresponding cultivar.

Predator rearing

Neoseiulus californicus was obtained from ‘Koppert Biological Systems’ and maintained on leaves of ‘Gaviota’ strawberry, which were previously infested with *T. urticae*. The stock culture of *N. californicus* was maintained in a growth chamber (27 ± 1 °C, 70 ± 5% RH and 16:8 hours L: D). Laboratory colonies of *N. californicus* were reared in the green plastic arenas (18 × 13 × 0.1 cm) on water–saturated sponge in a plexiglus box (25 × 18 × 10 cm) that was half-filled with water. The edges of the arenas were covered with moist tissue paper to provide moisture and prevent predator from escaping. Strawberry leaves infested with *T. urticae* were added to the arena three times a week.

Experiments

Gravid females of the predatory mites were transferred from the main culture onto strawberry leaves and left for 24 hours to oviposit. Only one egg was kept on each leaflet and the female mite and additional eggs were removed. The leaflet of each strawberry culture (2×2 cm^2) was placed upside down on green plastic sheet ($3 \times 3 \times 0.1$ cm) placed on top of a wet sponge in a Petri dish (3 cm diameters) containing water. The edges of the arenas were covered with moistened tissue paper to provide moisture and prevent predator from escaping. Water was added daily to the tray to keep the tissue paper moist. Leaves of strawberry cultivars were sprinkled with maize pollen followed by *T. urticae* eggs (30 eggs), which were replaced daily. After adult emergence, each female was coupled with one male and fed with the same diet. The duration of developmental stages of the predator was recorded at 12-hour intervals. The number of eggs oviposited by each female were recorded daily. The experiments were continued until the death of all individuals. For each cultivar, 70-100 individuals were tested.

To estimate the number of trichomes, twenty leaves per cultivar were excised from the middle of the primary vein at a distance of 10 cm from the base of the leaves. The number of trichomes (on the limb and vein) per cm^2 of the lower surface of the leaflets and the length of trichome was counted under a stereomicroscope.

Statistical analysis

Before analysis, all data were tested for normality with Mintab software. Duration of different stages, including male and female and those which died before adult stage and female daily fecundity were subjected to analysis of variance. Differences in the duration of different life stages and fecundity of the predatory mite were analysed using one-way ANOVA. Statistical differences among means were evaluated using Tukey test ($P < 0.05$) (SPSS Inc, 2012). The life tables of the predator were constructed based on two sex life table (Chi, 2005). The life table parameters were estimated based on Chi and Liu's method (1985), using data of both sexes and the variable developmental rate among individuals. The age-stage specific survival rate (s_{xj}, where x = age and j = stage), the age specific survival rate (l_x), the age specific fecundity (m_x) and the growth parameters including (r (the intrinsic rate of increase), λ (the finite rate of increase; $\lambda = e^r$), R_0 (the net reproduction rate), and T (the mean generation time) were calculated using TWO SEX MSChart program (Chi, 2005). Intrinsic rate of increase was estimated using the iterative bisection method from the Euler-Lotka formula with age indexed from 0 (Goodman, 1982).

The variance and standard error of population growth parameters were estimated by the bootstrap procedure. Life table parameters were compared using the paried bootstrap test, based on confidence interval. To obtain stable estimate, 10000 replications were used. Because bootstrapping uses random re sampling and if a small number of replications were used, it would result in variable means and standard errors which could end up in unreliable results. Multiple comparison tests among treatments were conducted in KrusKalmc program. The graphs were depicted using SigmaPlot software (Sigmaplot, 2011).

Results

The duration of different life stages of *N. californicus* fed on *T. urticae* on seven strawberry cultivars is shown in Table 1. *Neoseiulus californicus* completed its development on all studied strawberry cultivars. Incubation period was different among treatments ($P < 0.05$). Protonymphal stage duration, APOP (adult preoviposition period), and TPOP (total preoviposition period) were significantly different among different cultivars (Table 1). On different strawberry cultivars leaves, more than 92% of the eggs (ranged 92 97%) hatched. The total immature mortality of N. californicus ranged from 21% to 37% (Fig. 1). The male and female longevity (mean number of days from adult emergence to death) of *N. californicus* was not significantly different

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on the tested strawberry cultivars (Table 1). In addition, the duration of total lifespan of *N. californicus* did not indicate any significant difference among the tested cultivars. Total fecundity of *N. californicus* reared on 'Chandler' (13.29 ± 1.01), 'Aliso' (11.25 ± 0.95) and 'Marak' (11.18 ± 0.95) was higher than that observed on the other cultivars.

The analysis of the life table parameters of *N. californicus* indicated significant difference among the tested cultivars (Table 2). The individuals reared on 'Chandler' had the highest intrinsic rate of increase, as well as net reproductive rate. In addition, our research revealed that the longest mean generation time of *N. californics* was obtained on 'Aliso' (Table 2).

The age-stage-specific survival rate (s_{xj}), proability that a newly hatched *N. californicus* mite will survive to age x and stage j, (Fig. 2) shows the survivorship and stage differentiation, as well as the variable developmental rate. The curve of l_x (the age-specific survival rate (Fig. 4) is a simplified version of the curves in Fig. 2. Age-specific fecundity (m_x) of *N. californicus* fed on *T. urticae* on different cultivars is shown in Fig. 4. The survival curve of cohort usually shows stages overlapping due to the variable developmental rates among individuals. The life expectancy of newly hatched egg of *N. californicus* on seven strawberry cultivars were 9.90, 9.38, 11.43, 8.20, 9.50, 9.19 and 7.94 days on 'Aliso', 'Camarosa', 'Chandler', 'Gaviota', 'Marak', 'Seqoiua' and 'Yalova', respectively, as shown in Figure 3.

There is significant difference in the number of trichomes on the lower surface of leaves among different strawberry cultivars ($F_{6,63}$ = 57.93, P < 0.01). The number of trichomes/cm^2 of a leaf was lower in 'Chandler' compared with other cultivars (Table 3). The length of trichomes did not show any significant difference (Table 3).

Discussion

The leaf structure of the host plant can affect the development and reproduction of the predatory mite. In present study seven strawberry cultivars with different density of trichomes on their leaves were used. Structure of the leaf surface such as trichomes, domatia, pubescence affect feeding, mating, oviposition and other behaviours of phytoseiid mites (Kreiter *et al*., 2002).

In this study, the total immature mortality on different strawberry cultivars ranged from 21–37%, while, juvenile mortality of *N. californicus* on other strawberry cultivars was 3% (Castagnoli *et al*., 1999a). Croft *et al*. (1998) reported that the survival rate of *N. californicus* fed on mixed life stages of *T. urticae* during seven days on apple leaves arena was 72%. In addition, Gotoh *et al*. (2004) reported the survival rate of immature stages and its hatchability 97.5% and 98.9%, respectively. This difference might be due to differences in laboratory conditions, host plant structure or prey species.

Table 1 Duration of different stages, adult longevity and fecundity (Means ± *SE*) of *Neoseiulus californicus* on *Tetranychus urticae* reared on leaflets of seven strawberry cultivars.

Developmental time	Egg	Larva	Protonymph	Deutonymph	Female (adult longevity)	Male (adult longevity)	APOP	TPOP	Lifetime fecundity
Marak	1.94 ± 0.05^{ab}	0.63 ± 0.04	0.78 ± 0.05^{a}	1.07 ± 0.05	12.32 ± 0.58	7.91 ± 1.24	1.23 ± 0.21^{bc}	5.44 ± 0.19^{b}	11.18 ± 0.95^{ab}
Yalova	1.98 ± 0.03^{a}	0.56 ± 0.03	0.64 ± 0.04^{bc}	1.06 ± 0.07	12.12 ± 0.80	6.78 ± 0.78	1.19 ± 0.13^{bc}	5.41 ± 0.14^{b}	9.25 ± 1.22^{bc}
Aliso	1.90 ± 0.04^{abc}	0.63 ± 0.04	0.62 ± 0.03^{bc}	1.17 ± 0.06	12.73 ± 0.89	7.83 ± 1.31	1.70 ± 0.15^{a}	6.02 ± 0.21^{a}	11.25 ± 0.95^{ab}
Gaviota	1.92 ± 0.04^{abc}	0.56 ± 0.03	0.78 ± 0.05^{a}	1.02 ± 0.02	10.06 ± 0.62	6.60 ± 0.87	0.75 ± 0.19^{c}	4.97 ± 0.17^{b}	6.90 ± 0.53^{c}
Sequoia	1.81 ± 0.04^{c}	0.58 ± 0.03	0.76 ± 0.05^{ab}	1.03 ± 0.03	11.53 ± 0.70	7.25 ± 0.80	1.09 ± 0.21^{bc}	5.23 ± 0.24^{b}	8.40 ± 0.40^{c}
Camarosa	1.88 ± 0.03^{abc}	0.58 ± 0.03	0.67 ± 0.04^{abc}	1.08 ± 0.05	12.07 ± 0.51	9.37 ± 1.05	1.02 ± 0.11^{bc}	5.27 ± 0.16^{b}	8.91 ± 0.45^{bc}
Chandler	1.83 ± 0.05^{bc}	0.54 ± 0.02	0.68 ± 0.04^{abc}	1.03 ± 0.02	13.23 ± 0.62	9.10 ± 1.49	1.31 ± 0.13^{ab}	5.42 ± 0.17^{b}	13.29 ± 1.01^{a}
F	2.23	1.28	2.98	1.38	1.80	0.81	3.93	3.17	5.94
df	319	283	252	205	133	65	133	133	133
P	0.04	0.26	0.008	0.22	0.10	0.56	0.0012	0.006	< 0.0001

Means followed by the same letter(s) within a column are not significantly different based on Tukey test (α = 5%).

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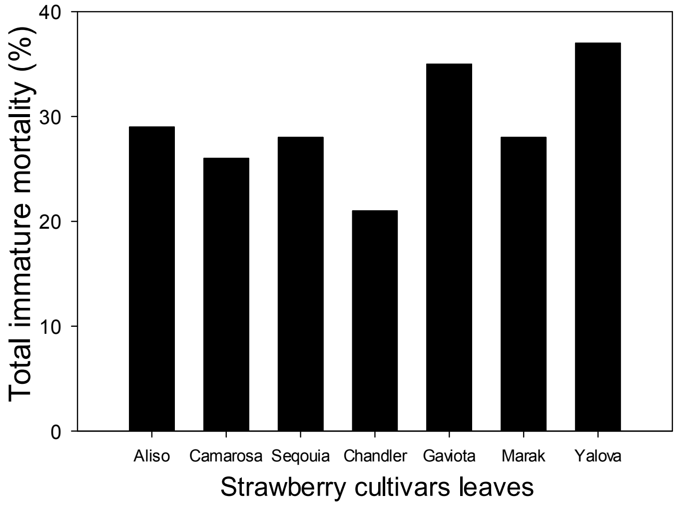


Figure 1 The total immature mortality (%) of *Neoseiulus californicus* reared on leaflets of seven strawberry cultivars.

Table 2 Intrinsic rate of increase (*r*), finite rate of increase (*λ*), net reproductive rate (R_0) and mean generation time (*T*) of *Neoseiulus californicus* on *Tetranychus urticae* reared on leaflets of seven strawberry cultivars.

Parmeters	*R* (day $^{-1}$)	□ (day $^{-1}$)	R_0 (offspring/individual)	*T* (day)
Marak	0.15 ± 0.02^{ab}	1.16 ± 0.03	3.80 ± 0.82^{b}	9.05 ± 0.30^{b}
Yalova	0.10 ± 0.03^{b}	1.11 ± 0.03	2.60 ± 0.65^{b}	9.33 ± 0.45^{ab}
Aliso	0.14 ± 0.02^{ab}	1.16 ± 0.02	4.37 ± 0.75^{cb}	$10.2\ 4 \pm 0.37^{a}$
Gaviota	0.10 ± 0.03^{b}	1.11 ± 0.03	2.18 ± 0.48^{b}	7.64 ± 0.19^{c}
Sequoia	0.12 ± 0.02^{b}	1.13 ± 0.03	2.86 ± 0.58^{b}	8.64 ± 0.32^{b}
Camarosa	0.14 ± 0.02^{ab}	1.15 ± 0.02	3.38 ± 0.60^{b}	8.84 ± 0.28^{b}
Chandler	0.20 ± 0.02^{a}	1.22 ± 0.02	6.13 ± 1.03^{a}	9.10 ± 0.26^{b}
F	2.21	1.97	3.22	5.89
df	383	383	383	383
P	0.04	0.07	0.004	< 0.0001

Means followed by the same letters within a column are not significantly different based on Kruskalmc test (α = 5%).

Our study showed that egg incubation, larval, protonymphal and deutonymphal periods of *N. californicus* varied from 1.81 to 1.98, 0.54 to 0.63, 0.62 to 0.78 and 1.03 to 1.17 days, respectively.The development duration of this predator on lima bean leaves when fed on *T. urticae* was reported as 1.5, 0.4, 0.9, 0.9 days for the above mentioned stages, respectively (Gotoh *et al*., 2004). Furthermore, the duration of egg, larvae, protonymph, deutonymph periods of this predator were 1.60, 0.78, 1.44 and 1.24 days when it was reared on kidney bean leaves with sufficient composite stages of *T. urticae* as prey (Canlas *et al*., 2006). Our results showed that developmental times were 10.06 and 6.60 days for female and male, respectively, which was similar to what was obtained by Maroufpour *et al*. (2013); but was higher than the study of Tohdi *et al.* (2013) who reported the average of 5.69 and 5.35 days for female and male, respectively. The adult longevity of *N. californicus* was not different among cultivars in the present study. Gotoh *et al*. (2004) showed that the total adult longevity was 33.8 days at 25 °C. Development of predatory mites may vary depending on prey species as well as host plant.

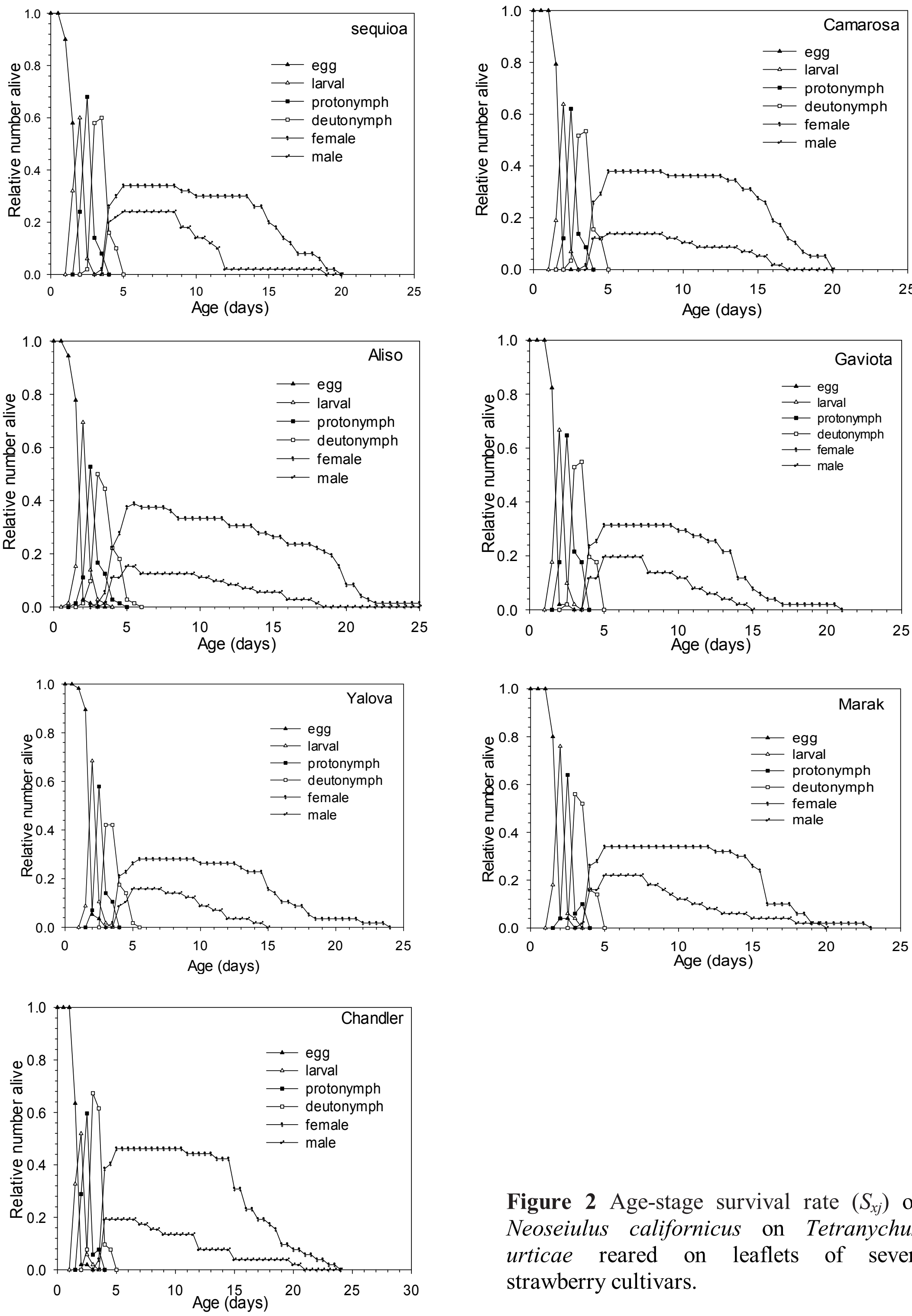
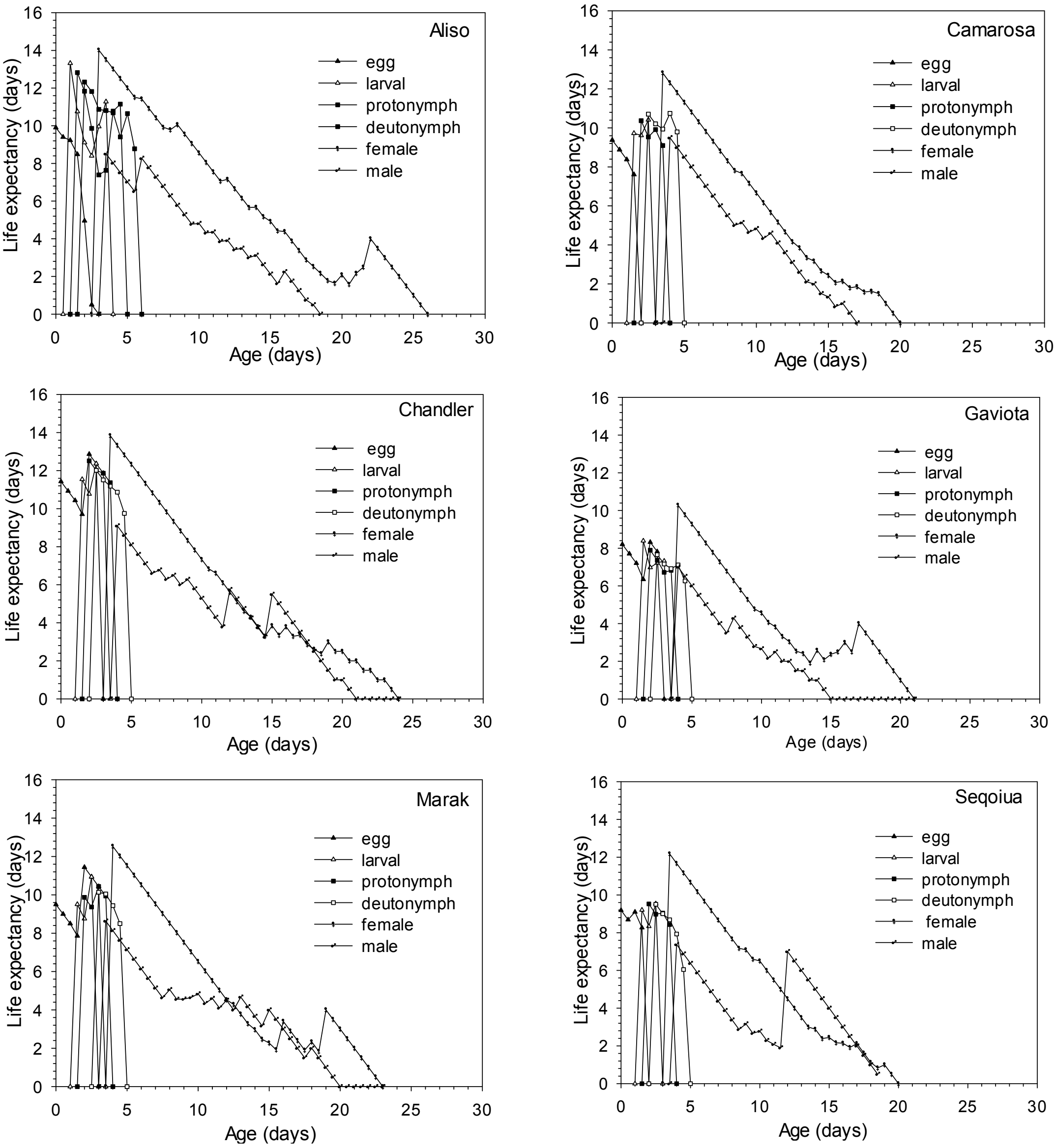


Figure 2 Age-stage survival rate (S_{xj}) of *Neoseiulus californicus* on *Tetranychus urticae* reared on leaflets of seven strawberry cultivars.



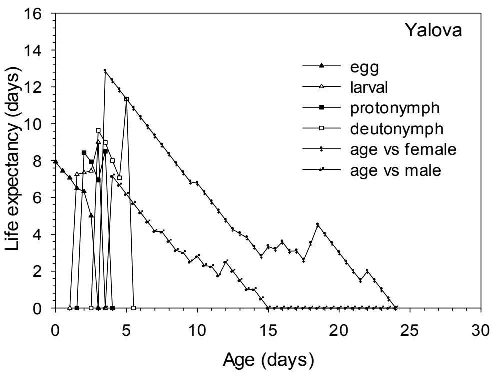
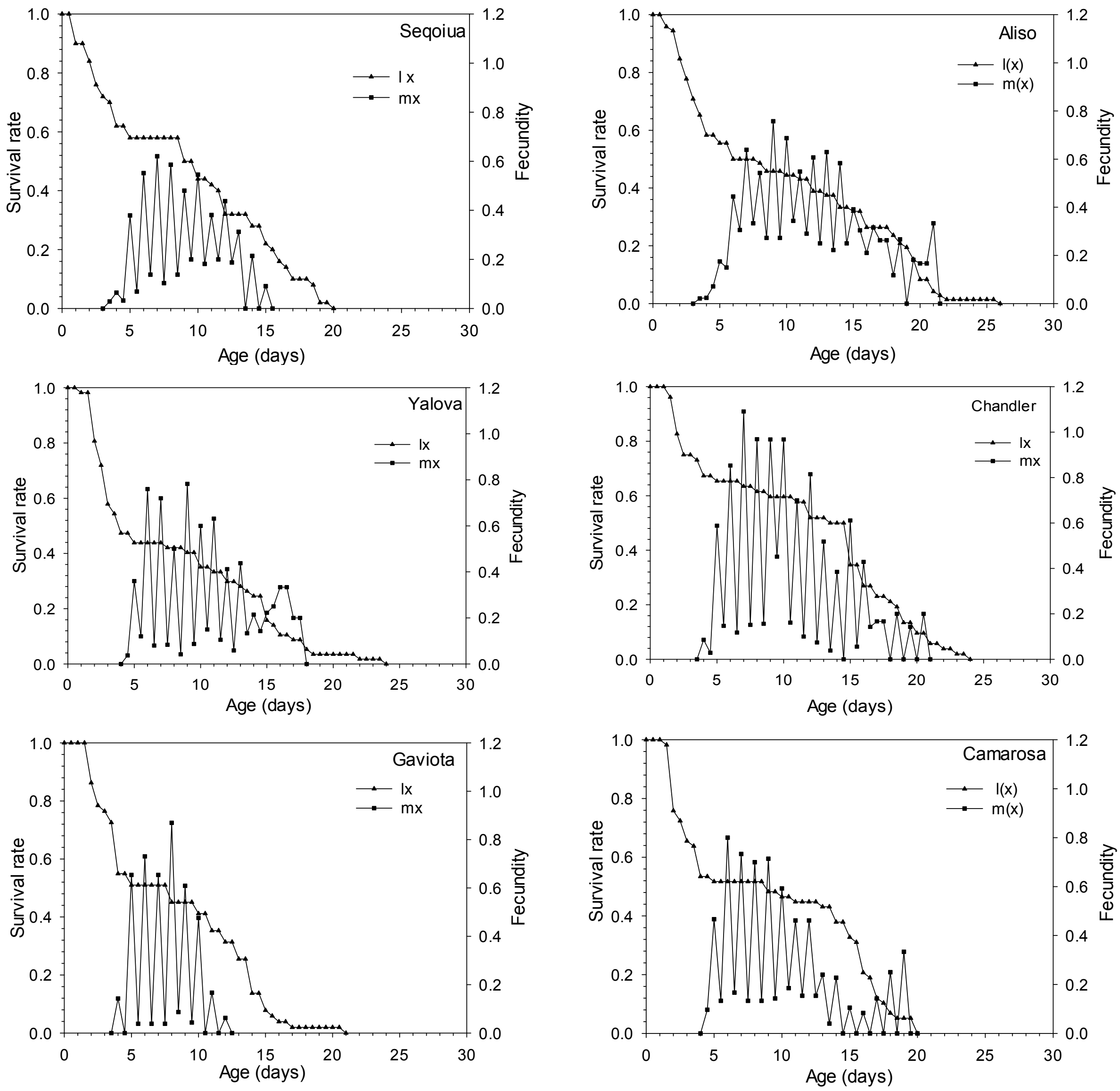


Figure 3 Life expectancy (e_{xj}) of *Neoseiulus californicus* on *Tetranychus urticae* on leaflets of seven strawberry cultivars.



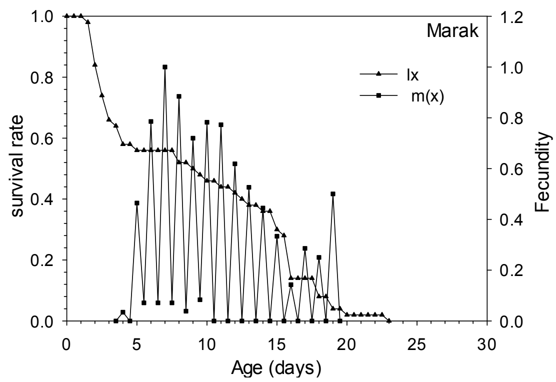


Figure 4 Age-specific survivorship (l_x), age-specific fecundity of the total population (m_x) of *Neoseiulus californicus* on *Tetranychus urticae* reared on seven strawberry cultivars.

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Table 3. Mean (± *SE*) number and length of trichomes on lower leaf surface of seven strawberry cultivars.

Parameters	Number of trichomes (mm^2)[1]	Length of trichomes (mm)[1]
Chandler	227.1 ± 2.95[b]	1.8 ± 0.06[a]
Camarosa	293.7 ± 1.87[a]	1.6 ± 0.05[a]
Yalova	292.0 ± 2.43[a]	1.5 ± 0.06[a]
Aliso	291.9 ± 8.68[a]	1.6 ± 0.040[a]
Gaviota	290.6 ± 3.01[a]	1.6 ± 0.05[a]
Seqouia	289.3 ± 4.04[a]	1.7 ± 0.05[a]
Marak	287.4 ± 4.43[a]	1.5 ± 0.06[a]
F	57.93	8.90
df	143	143
P	0.0012	0.1798

[1] Means within a column followed by the same letter(s) are not significantly different based on Tukey's test (α = 5%).

Phytoseiid mite usually lay their eggs on the host plants which can provide enough prey for their progeny (Ragusa and Tsolakis, 1995). When *N. californicus* was reared on strawberry (var:'Honeboy') for two generations, the oviposition rate varied from 2.87 to 3.18 eggs/female/day in F_1 and F_2, respectively (Castagnoli *et al*., 1999a). Croft *et al* (1998) reported that the number of eggs production per day by *N. californicus* was 3.45 eggs/day when fed on *T. urticae*. In this study, the total fecundity of *N. californicus* on seven strawberry cultivars ranged from 6.90 to 13.29 eggs/female/day. The less egg production may be due to using single-mate females, quality of prey used and the kind of host plant.

The intrinsic rate of increase (*r*) of *N. californicus* was reported as 0.27 day^{-1} at 25 °C (Gotoh *et al*., 2004). It was also estimated on different host plants including bean, tea, cherry, sour orange and apple (Gotoh *et al*., 2006). In our study, low *r*-value (0.10 day^{-1}) in 'Gaviota' and 'Yalova' is probably due to low nutritional value of these plants for prey leading to low performance of predator and/or reduced consumption rate. The value of *r* when *N. californicus was* reared on *T. urticae* eggs and maize pollen was 0.17 and 0.23 day^{-1}, respectively (Saber, 2012). When *N. californicus* was fed on immature of *T. urticae*, it's *r*-value (0.154 day^{-1}) was lower than that obtained on the almond pollen (0.232 day^{-1}) or maize pollen (0.179 day^{-1}) (Khanamani *et al.,* 2016). In another research, with all stages of *T. uricae* as prey, the intrinsic rate of *N. californicus* ranged from 0.16 to 0.23 day $^{-1}$ on kidney bean leaves (Canlas *et al*., 2006). Tohdi *et al*. (2013) also recorded 0.151 day^{-1} for this predatory mite. The *r*- value of *N. californicus* on lima bean leaves was 0.274 day^{-1} at 25 ºC (Gotoh *et al.*, 2004). In our experiments, all developmental stages of *T. urticae* with high density were used. Meanwhile, the lower *r*-value in this study may be due to the prey webbing. Also differences in rearing techniques, *T. urticae* host plant or experimental condition or differences in the *T. urticae* stages used as food may be of souces of variation.

Many factors have been known to influence the effectiveness of natural enemies in the glasshouse, such as plant architecture (Kareiva and Sahakian, 1990; Grevstad and Klepetka, 1992), surface texture (Kareiva and Sahakian, 1990) and plant chemistry (Price *et al*. 1985). Scott *et al*. (1999) showed that plant architecture, leaf morphology and plant chemistry influence the successful establishment of predatory mites. The trichomes may also affect predatory mite's activity. The presence of trichome on leaf surface may trap pest or predator, disrupt their movement, or affect them through toxic compounds that are produced from special glands (van Lenteren *et al*., 1995). In this study, the highest *r*-value of *N. californicus* on 'Chandler' could be due to the leaf morphology, because the least density of trichomes was observed in this cultivar. Among the seven strawberry cultivars, 'Chandler' was the best for the development and reproduction of *N. californicus* on *T. urticae*, because it resulted in the highest *r*-value and the lowest total immature mortality. Zhang *et al*. (2016) reported that among five host plant species, green bean (with the lowst density of trichome and the shortest trichome) was the best and cucumber (with the longest trichome) was the worst for the development and reproduction of *N. bicauds* preying on *T. turkestani*.

Phytoseiid species showed different development, reproduction and efficiency according to roughness and hairness of plant leaves, some phytoseiid species developed faster on smooth, glabrous leaves than on rough, hairy ones. Steinite and Levinsh (2003) found that simple hairiness was very variable characteristic depending on phenology of plant and growth condition. Rasmy and El-Banhawy (1974) reported that smooth glabrous orange leaves promoted a faster development of *Euseius scutalis* Athias- Henriot. Kreiter *et al* (2002) reported that dense trichomes of host plant were favourable for development of *Kampimodromus abberrans* (Oudemans) population.

Cedola *et al*. (2001) determined that *N. californicus* was an ineffective control agent of *T. urticae* on tomato cultivars with a high number of glandular trichomes. Developmental time and oviposition rate of *N. californicus* were both directly and indirectly affected by trichome density of tomato; whereas offspring sex ratio, survival of juveniles and adult females were not affected (Kollar *et al*., 2007). The biological parameters of *N. californicus* preying on *T. urticae* on tomato and strawberry were compared, it was found that sex ratio, mortality, oviposition were more advantageous on strawberry (Castagnoli *et al*., 1999a). Ottaviano *et al*. (2013) reported that the number of prey consumed per day per female of *N. californicus* differed between strawberry cultivars. Fecundity of *N. californicus* did not differ among cultivars. The glandular hairiness affected neither consumption nor fecundity of the predatory mite.

Our results showed that 'Gaviota' and 'Yalova' were not suitable host plant for *N. californicus* compared with other cultivars leading to highest immatures mortality and that cv. 'Chandler' with low trichome density was suitable host plant for the predatory mite. The cohort reared on 'Chandler' had a greater reproductive potential because of having the highest *r*-value, indicatingthis cultivar is more suitable than the others tested. It can be concluded that predators may respond differently to leaf structure of the tested host plants.The morphological diversities of seven strawberry cultivars can be the reason for differences in suitability of different host plants tested. *Neoseiulus californicus* was an effective control agent of *T. urticae* on strawberry cultivar with the lowest density of trichomes. Preadult mortality or low reproductive rate in some cultivars can be explained by toxic secondary metabolites or deficiency of primary essential nutrients for prey or predator.

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آماره‌های جدول زندگی کنه شکارگر *Neoseiulus californicus* (McGregor) روی رقم‌های مختلف توت‌فرنگی در شرایط آزمایشگاهی

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چکیده: کنه شکارگر *Neoseiulus californicus* (McGregor) از شکارگرهای مؤثر در کنترل کنه‌های تارتن محسوب می‌شود. تأثیر هفت رقم توت‌فرنگی روی ویژگی‌های زیستی و رشدی کنه شکارگر *N. californicus* در شرایط آزمایشگاهی (دمای ۱ ± ۲۷ درجه سلسیوس، ۵ ± ۷۵ درصد رطوبت نسبی و ۱۶ ساعت روشنایی و ۸ ساعت تاریکی) مورد بررسی قرار گرفته است. اختلاف معنی‌داری در تعداد تریکوم برگ‌های رقم‌های توت‌فرنگی مشاهده شد. داده‌ها براساس تئوری جدول زندگی سنی- مرحله رشدی ویژه دوجنسی تجزیه شدند. طول دوره جنینی و پروتونمف کنه شکارگر روی رقم‌های مختلف با یک‌دیگر اختلاف معنی‌داری را نشان می‌دهد. اختلاف معنی‌داری در بقا کنه روی رقم‌های مختلف توت‌فرنگی مشاهده نشد. طولانی‌ترین طول دوره پیش از تخم‌گذاری کنه شکارگر روی رقم آلیسو (۱/۷ روز) مشاهده شده است. تعداد نتاج تولید شده به‌ازای هر فرد ماده روی رقم‌های گاویتا و سیکوا (به‌ترتیب ۶/۹۰ و ۸/۹۱ تخم) کم‌تر از تعداد نتاج تولید شده روی سایر رقم‌های مورد آزمون است. بیش‌ترین نرخ ذاتی افزایش جمعیت (۰/۲۰ روز $^{-1}$) و میزان تخم‌گذاری (۱۳/۲۹ تخم) روی رقم چاندلر مشاهده شد، کیفیت مواد غذایی بهتر این رقم برای شکار (کنه *Tetranychus urticae* Koch) و یا تراکم کم‌تر تریکوم در برگ‌های این رقم می‌تواند از دلایل این اختلاف باشد. در بین رقم‌های توت‌فرنگی، سیکوا، گاویتا و یالوا برای رشد و تولیدمثل کنه *N. californicus* نامناسب هستند.

واژگان کلیدی: آماره‌های جدول زندگی، *Neoseiulus californicus*، رقم‌های توت‌فرنگی، تریکوم