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INCIDENCE OF MITES INHABITING STORED ONION BULBS IN EGYPT, WITH DESCRIPTION OF A NEW SPECIES OF THE GENUS *Lasioseius* berlese (ACARI: GAMASINA)

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ABSTRACT

Survey conducted recently in Egypt indicated the presence of 12 mite species associated with stored onion bulbs, *Allium cepa* L.. The frequencies of these species occurrence were: *Rhizoglyphus echinopus* (70%), *Lasioseius bispinosus* (65%), *Kleemannia plumosus* (40%), *Cheyletus malaccensis* (35%), *Macrocheles africanus* (35%), *Proctolaelaps aegyptica* (30%) , *Tyrophagus putrescentiae* (25%), *Dendrolaelaps aegypticus* (20%), *Cheletomorpha lepidopterorum* (15%); *Sancassania berlesei* (15%), *Lasioseius neocepa* n.sp. (10%) and *Parasitus* sp. (5%). Dominance of the identified species was given . The new mite species *L. neocepa* n.sp. is described and illustrated.

Keywords: Acarina, Morphology, bulb mites, Acaridae, Blattisociidae, *Lasioseius neocepa*.

INTRODUCTION

Mites are among of the most important arthropod pests attacking onion crop. Bulb mites of the genus *Rhizoglyphus* (Claparède) have been identified as serious and damaging pests associated with onion bulbs in both field and in storage around the world. Basic informations on their ecology, biology and control strategies have been discussed (Rangarajan *et al.* 1972; Hosny *et al.* 1988; Daiber 1996; Abdel-Halim 1998; Ignatowicz 1998 ; Diaz *et al.* 2000 and Fan & Zhang 2003). Many predaceous mites are considered as biological control agents of certain acarine pests in stored agricultural products (Zaher 1986; Elbolok *et al.* 1990 ; Hoda *et al.* 1990 ; Kucerova & Horak 2004 and Palyvos *et al.* 2008). The aim of this study is to clarify the incidence of mite species occurring on stored onion bulbs *Allium cepa* L. in Zifta (Middle Delta) and Kom-Hamada (West Delta) districts, Egypt, to estimate their agronomic interest. Also, description of the new mite species *Lasioseius neocepa* was given illustrated .

MATERIALS AND METHODS

Samples of 10 stored onion bulbs *Allium cepa* (nearly subequal in size) each were taken from Zifta and Kom- Hamada districts, Egypt, throughout two successive years 2008 and 2009. Samples were examined using a stereomicroscope. Berlese modified funnel was used for extracting mite individuals from decaying bulbs. Collected mite individuals were cleared in lactophenol, mounted in Hoyer's medium on microscopic slide glass and identified according to (Chant 1958; Hughes 1976; Krantz 1978 ; Zaher 1986; Fan & Zhang 2003 ; Christian & Karg 2006 and Krantz & Walter

2009). A detailed description of adult females and males of the new species *Lasioseius neocepa* n. sp. was done. The setal nomenclature follows that of Lindquist and Evans (1965). Measurements are given in micrometers. Type specimens of the new species and mounted slides are deposited in the collection of Plant Protection Department, Faculty of Agriculture, Zagazig University, Egypt.

The collected species were categorized using the criteria of dominance and frequency (Curry 1973; Cusack *et al.* 1975 ; Emmanouel *et al.* 1994 and Palyvos *et al.* 2008). Dominance indicates the percentage of individuals of a given species, compared with the total number of individuals of all species found. Hence, a given particular species is classified as "dominant", "influent" or "recedent", if it constitutes > 10, 5-10 or < 5% of the total number of individuals, respectively. Similarly three categories are recognized for the frequency of occurrence of a species in the samples, it is classified as "constant" , "accessory" or "accidental", if it occurs in >50, 25-50 or < 25% of the total number of samples, respectively.

RESULTS AND DISCUSSION

Survey of mite species associated with stored onion bulbs in Egypt .

Twelve species of mites were collected inhabiting onion bulbs *A. cepa* during storage in Kom- Hamada and Zifta districts , Egypt. Dominance and frequency of occurrence of these species are shown in Table 1. *R. echinopus* and *L. bispinosus* were constant with the highest values of percent frequency of occurrence (70% and 65%). *K. plumosus, M. africanus, C. malaccensis, P. aegyptica* and *T. putrescentiae* were accessory and occupied the second rank among the identified species, with percent frequency of occurrence reaching 40, 35, 35, 30 and 25%, respectively. On the other hand *D. aegypticus, C. lepidopterorum, S. berlesei, L. neocepa* and *Parasitus* sp. were accidental and represented the least values of frequency of occurrence as they were 20, 15, 15, 10 and 5% , respectively.

Concerning the dominance of the identified species , it was found that *R. echinopus, L.bispinosus, M. africanus* and *T. putrescentiae* were dominant, with the highest values of 23.69, 17.27, 11.36 and 11.25% of the total number of individuals. *P. aegyptica, K. plumosus, C. malaccensis , S. berlesi* were influent and showed lower values of dominance reaching 8.41, 8.01, 7.67 and 6.42%, respectively. *L. neocepa*, *D. aegypticus, C. lepidopterorum* and *Parasitus* sp. were recedent as they recorded the lowest values of 2.22, 1.93, 1.78 and 0.28% , respectively. The identified species varied in their dominance and frequency of occurrence from one district to another (Table 1) . These findings are in accordance with the fact that *R. echinopus* is generally the most important and most frequent stored product mite on stored onion bulbs (Sandhu 1976 ; Smirnov & Smirnova 1978; Lee & Wen 1980 ; Gerson *et al.* 1985 and Gerson *et al.* 1991).

Table 1.Dominance and frequency of mite species collected from stored onion bulbs in two districts of Egypt.

Mite species	Dominance			Frequency of occurrence		
	Kom-Hamada	Zifta	Total collected samples	Kom-Hamada	Zifta	Total collected samples
Family: Acaridae						
Rhizoglyphus echinopus (Fumouze & Robin,1868)	28.07D	20.32D	23.69D	72.73C	66.67C	70.00C
Tyrophagus putrescentiae (Schrank, 1781)	6.92In	14.59D	11.25D	18.18Ac	33.33A	25.00A
Sancassania berlesei (Michael, 1903)	3.66R	8.55In	6.42In	9.09Ac	22.22Ac	15.00Ac
Family: Ameroseiidae						
Kleemannia plumosus (Oudemans, 1902)	6.53In	9.15In	8.01In	36.36A	44.44A	40.00A
Family : Blattisociidae						
Lasioseius bispinosus Evans , 1958	16.58D	17.81D	17.27D	63.64C	66.67C	65.00C
Lasioseius neocepa n.sp.	5.09In	-	2.22R	18.18Ac	-	10.00Ac
Family: Cheyletidae						
Cheletomorpha lepidopterorum (Shaw) Oudemdans, 1937	3.39R	-	1.48R	27.27A	-	15.00Ac
Cheyletus malaccensis Oudemans, 1903	8.09In	7.34In	7.67In	27.27A	44.44A	35.00A
Family :Digamasellidae						
Dedroplaelaps aegypticus (Metwally & Mersal, 1985)	2.74R	1.31R	1.93R	18.18Ac	22.22Ac	20.00Ac
Family :Macrochelidae						
Macrocheles africanus (Hafez, El-badry and Nasr , 1985)	11.62D	11.17D	11.36D	27.27A	44.44A	35.00A
Family :Melicharidae						
Proctolaelaps aegyptica (Nasr, 1978)	6.66 In	9.76In	8.41In	18.18Ac	44.44A	30.00A
Family :Parasitidae						
Parasitus sp.	0.65R	-	0.28R	9.09Ac	-	5.00Ac

Dominance: a given species is classified as dominant (D) influent (In) or recedent (R) if it constitutes >10, 5-10 or <5% of the total number of individuals, respectively.

Frequency: a species is classified as constant (C), accessory (A) or accidental (Ac) if it occurs in >50, 25-50 or < 25% of the total number of samples, respectively.

The most frequent and most dominant predatory mite *L. bispinosus* preys mainly on acarid mites. Nawar *et al.* (1990) reported that the bulb mite *Rhizoglyphus robini* Claparède was the most favourite prey of *L. bispinosus*. The predatory mite *M. africanus* was dominant and accessory , it was found in decaying bulbs that heavy infested with onion bulb fly larvae *Eumerus amoenus* Loew and acarid mites. Zaher (1986) recorded the predatory mite *Macrocheles matrius* (Hull) on roots of onion bulbs associated with different stages of the bulb fly *Delia antigua* Meig, acarid mite *R. robini* and free living nematodes. The other encountered species are common in other stored products (Zaher *et al.* 1986 ; Ostovan & Kamali 1995 ; Hubert *et al.* 2006 and Palyvos *et al.* 2008). The survey emphasizes the important of mites on stored onion bulbs, information that

may aid in understanding and preventing losses caused by mite contamination of these stored agricultural products.

Description of *Lasioseius neocepa* n.sp.

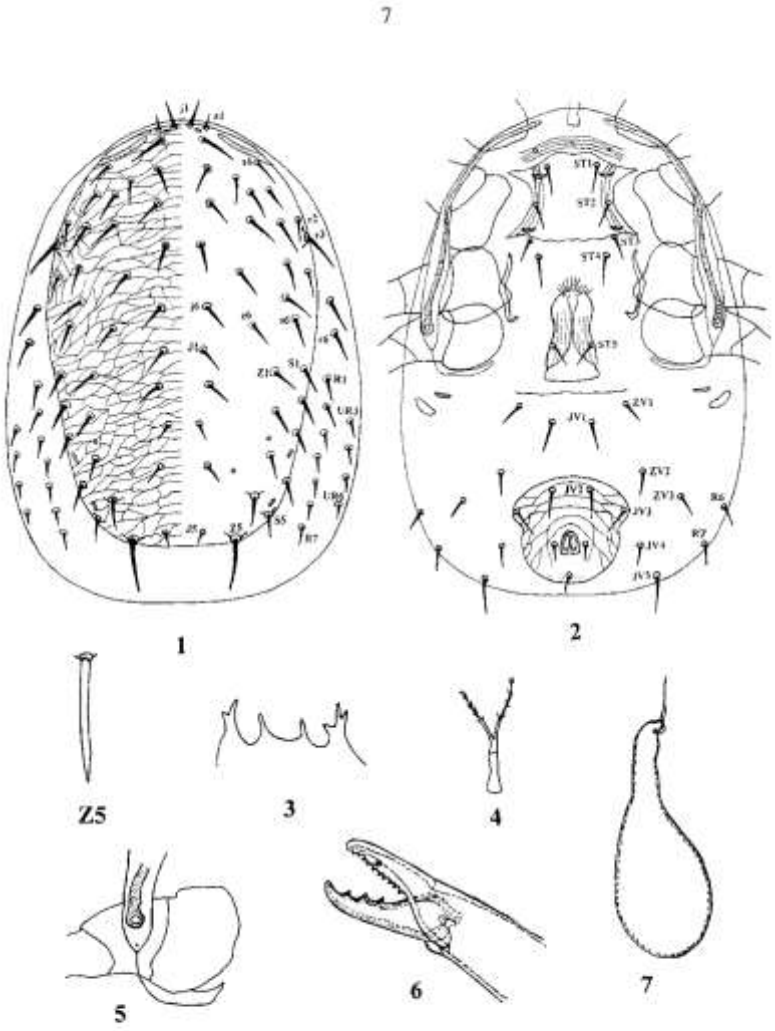
Female (Figs. 1-8) : Body oval, whitish yellow when alive , 636 in length and 456 at its greatest width. Dorsal shield 550 long, 363 wide , heavily rticulated and having 36 pairs of setae , of which 21 pairs on the anterior region (Fig. 1). Setae z1 the shortest and measuring 21, while setae r3 and s4 the longest measuring 48 and 45, respectively. Opithnotum bearing 15 pairs of nearly subsequal setae, of which setae Z5 is the longest (57), while setae J5 the shortest (18). Each of setae r3, Z4, Z5, and S5 arise on distinct tubercles. Three pairs of oval pores and two pairs of minute circular pores visible on dorsal shield . Thirteen pairs of marginal setae on interscutal membrane, of which two paris in anterior region (Fig. 1). Setal measurements ; j1= 39, j2 = 45, j3= 42, j4 = j5= j6=36, J1=33, J2=30, J3=J4=24, J5=18, z1=21, z2=39, z3=42, z4=45, z5=36, z6=33, Z1= Z2= Z3 =39, Z4=48, Z5=57, s1=s2=30, s3= s4=s5=s6=45, S1= S2=42, S3=39, S4=S5=42, r2=36, r3=48, r4=45, r5=39, r6=36, R1=R4=33, R2=R3=R5=R6=30, R7=36, UR3=UR4 = UR5= UR6= 24.

Venter: Tritosternum well developed , with two long serrate laciniae (Fig. 4). Presternal area striate, with a pair of small circular pores. Sternal shield nearly quadrate of 120 long and 126 wide, with slightly concaved lateral margins and its posterior edge undulate, linated along lateral margins and having two pairs of subequal sternal setae ST1 and ST2 (33 and 36 long) and two pairs of lyriform pores. Third pair of sternal setae (ST3) and metasternal setae (ST4) free on the integument measure, 27 and 33 long, respectively. Epigynial shield vase- shaped, almost covered with longitudinal striae, with lateral constriction just before the truncate posterior end, broadest width of 65 and bearing a pair of genital setae ST5, 18 long (Fig. 2).

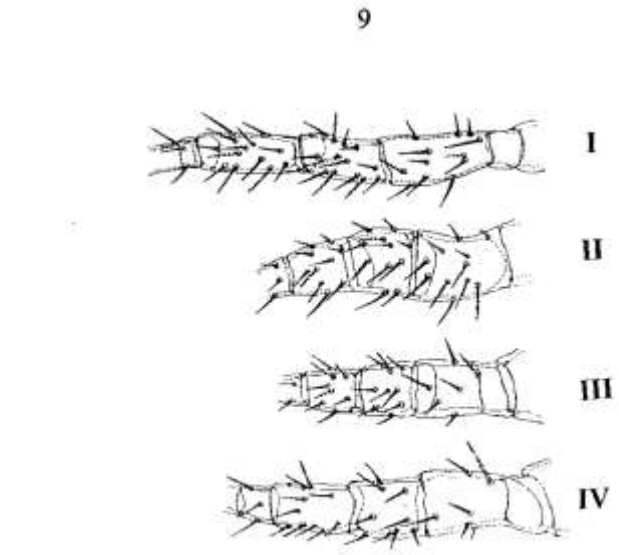
Ventrianal shield nearly rectangular, with conspicuous constriction behind setae JV3, covered with transverse striae and bearing 2 pairs of preanals JV2 and JV3 of 39 and 36, respectively. Length of ventrianal shield 136, width 132, 105, 108 at the level of setae JV3, at its waist and at the level of paranals, respectively. Six pairs of setae on integument surrounding ventrianal shield JV1, JV4, JV5, ZV1, ZV2, ZV3, measuring 36, 30, 56, 24, 30 and 21, respectively (Fig. 2). Two pairs of elongate metapodal plates, of which the posterior one rather longer and wider than the anterior. The posterior pair long 30 , whereas the anterior one of 15. Peritremal plate fused posteriorly with exopodal plate (Fig. 5); peritereme extending anteriorly to level of setae j2 (Fig.1). Tectum as in Fig. 3. Fixed digit of chelicera with 10 well developed teeth, movable digit with 3 stout teeth Fig. (6). Spermatheca with an elongate cervix of (33) and a distinct major duct of 21 long (Fig. 7). Setal formula of legs I- IV : femur 12-11-6-6, genu 13-11-9-9, tibia 13-10-8-10. Legs without macrosetae (Fig.8, I-IV).

Male (Figs. 9 & 10): Smaller than female with heavily reticulated dorsal shield of 450 long and 255 wide. Strenogenital shield smooth of 270 long and 156 at its greatest width , bearing 5 pairs of subequal simple setae, ST1, ST2, ST3, ST4 and ST5 , measuring 24, 24, 21, 21 and 24, respectively and two pairs of lyriform pores. Genital aperature located just behind the anterior

edge of sternogenital shield (Fig.9). Ventrianal shield nearly cone – shaped, of 168 long and broadest wide of 232, ornamented with transverse striae which mostly unite with each other forming a widely spaced network pattern and bearing 6 pairs of simple subequal setae of which setae JV2, JV3, and JV4 are slightly longer than others , measuring 33, 36 and 39 , respectively. Setae JV1 , ZV1 and ZV2 of 24, 27 and 27 , respectively (Fig. 9).



Figs.1-7. *Lasioseius neocepa* n.sp. (Female): 1-Dorsal view. 2-Ventral view. 3-Tectum. 4-Tritosternum. 5-Peritreme and exopodal plate. 6- Chelicera. 7. Spermatheca.



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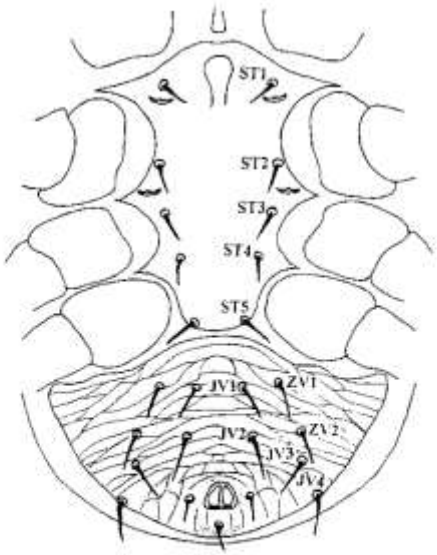

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Figs.8-10. *Lasioseius neocepa* **n.sp. (8-Female): femur, genu and tibia of legs I-IV. (9 &10 Male) : 9-Ventral view. 10-Spermatodactyl.**

Spermatodactyl shank elongate with swollen distal end. Cheliceral fixed digit multidentate (8 teeth), movable digit unidentate (Fig.10).

Remarks: This species is closely related to *L. allii* Chant and *L. bispinosus* Evans (Chant 1958 &1963) in having ventrianal shield with 2 pairs of preanals and the same number of setae on the dorsal shield. It differs from the former in having reticulated dorsal shield, sternal shield with 2 pairs of setae, endopodal plate well developed, two pairs of metapodal plates, cheliceral fixed digit with 10 teeth, movable digit tridentate and from *L. bispinosus* in sternal shield not excavated posteriorly, the anterior pair of sternal setae simple (not thorn like) and having 13 pairs of marginal setae on the interscutal membrane.

Holotype. A female found in association with the acarid mite *Rhizoglyphus echinopus* attacking stored onion bulbs *Allium cepa* in Kom-Hamada district, Behira Governorate, Egypt at 19 November 2008.

Allotype. One male collected from the aforementioned habits and locality .

Paratypes. Five females and four males collected with the same data and date.

Etymology. The species name is based on the name of the host plant from which it was collected.

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الحلم المصاحب للبصل المخزون فى مصر مع وصف لنوع جديد يتبع جنس *Lasioseius* (أكارى : جامازينا)

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أسفرت دراسة الحصر لأنواع الاكاروسات المصاحبة للبصل المخزون *Allium cepa* L. فى مصر عن تسجيل أثنى عشر نوعاً ، تكرار تواجد كل منها كما يلى :
Rhizoglyphus echinopus (٪70), *Lasioseius bispinosus* (٪65), *Kleemannia plumosus* (٪40), *Cheyletus malaccensis* (٪35), *Macrocheles africanus* (٪35), *Proctolaelaps aegyptica* (٪30) , *Tyrophagus putrescentiae* (٪25), *Dendrolaelaps aegypticus* (٪20), *Cheletomorpha lepidopterorum*(٪15); *Sancassania berlesei* (٪15), *Lasioseius neocepa* n.sp. (٪10) and *Parasitus* sp. (٪5).

تم مناقشة سيادة تلك الأنواع ، كما تضمنت الدراسة وصفا موروفولوجيا تفصيليا للنوع الجديد من الحلم *Lasioseius neocepa* والذى لم يوصف من قبل0

قام بتحكيم البحث

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