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SHORT NOTE

MITES OF STORED CEREALS IN MID-BELGIUM: A QUALITATIVE SURVEY

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Several studies indicate that mite species, belonging to 36 genera and 10 families, can be found in grain silos (1, 2, 3). Four groups of mites are represented: Astigmata, Mesostigmata, Prostigmata and occasionally, Cryptostigmata (4). Species belonging to Astigmata are economically the most important since they consume human food supplies, inoculate fungi into clean food commodities and leave dead bodies and faecal pellets, making the stored food unfit for consumption. Furthermore, some species of mites commonly found in stored cereals (and also in house dust samples) are considered as a public health problem since they cause allergic reactions among sensitive people (5, 6, 7).

Mites of stored cereals and stored food products have been well studied in the world (8, 9, 10, 11, 12, 13). Nevertheless, the last survey made in Belgium was realized in 1956 (14). In order to update our knowledge in this field, we have studied populations of mites found in storage places in mid-Belgium. This study reported the occurence of some species without any precision concerning their origins.

During the month of June 1994, just before the harvesting of new cereals, 18 grain stores, chosen randomly in mid-Belgium, were visited. Samples were obtained from highly dusty places (endless screw, corner, sides, motors, etc.) located near the silos. In each place, 5 to 11 samples of 100 g of dust were taken. Samples were sieved by shaking thirty times in a 1 mm-mesh sieve and living mites were manually taken and conserved in a methanol solution. Mites were then removed, slide-mounted in Hoyer medium and identified.

Table I presents localities and identities of the species found around the grain silos. The most commonly represented species (14 grain silos out of 18) is *Acarus siro* L. (Astigmata: Acaridae). *A. siro* is a cosmopolitan species, quantitatively dominant in our samples. This mite is frequently found in European grain silos and is responsible for important damage to stored grain. With its powerful chelicerae, *A. siro* rends the pericarp, penetrates into the grain and lives on germ or endosperm. In addition to the reduction of germinative quality of the grain, the presence of the mite leads to an accumulation of faecal material, exuvia and corpses, making stored products unfit for human consumption. Furthermore, *A. siro* facilitates the transfer of fungus spore in the silos. Cases of resistance to lindan, methacrifos and pirimiphos-methyl has been reported in Great-Britain (15,

16). The natural habitat of this mite seems to be the nests of small mammals (2). But the most important source of mite infections of fresh wheat could be considered as being the dust present in the uncleaned places. *A. farris* (Oudemans), a cosmopolitan species closely resembling *A. siro* (1) was not observed in this study.

TABLE I

Localities and identities of the mite species found around 18 grain silos in mid-Belgium. A.s.: Acarus siro; T.p.: Tyrophagus putrescientiae; L.d.: Lepidoglyphus destructor, C.e.: Cheyletus eruditus; T.sp.: Tarsonemus sp.; G.d.: Glycyphagus domesticus. Tot.: number of species found in each grain silos, n: number of samples.

Localities	*Species*						*Tot.*	*n*
	A.s.	*T.p.*	*L.d.*	*C.e.*	*T.sp.*	*G.d.*		
1. Sombreffe	-	-	-	-	-	-	0	5
2. Ambresin	+	+	-	+	-	-	3	7
3. Sombreffe	+	-	-	+	-	-	2	5
4. Thisnes	-	-	-	-	-	-	0	5
5. Hannut	+	-	-	-	-	-	1	5
6. Hammes-Mille	-	-	-	-	-	-	0	5
7. Ambresin	+	-	-	+	-	-	2	5
8. Beauchevin	+	-	+	+	-	-	3	5
9. Meeffe	+	-	-	-	-	-	1	7
10. Grand-Leez I	+	-	+	+	-	-	3	11
11. Grand-Leez II	+	+	-	+	-	-	2	5
12. Seneffe	+	-	-	-	-	-	1	7
13. Fleurus	+	-	+	+	-	+	4	6
14. Corbais	+	-	-	+	+	-	3	7
15. Genappe	+	-	-	-	-	-	1	7
16. Feluy	+	-	-	-	-	-	1	6
17. Nivelles I	-	-	+	+	-	-	2	6
18. Nivelles II	+	-	-	+	-	-	2	1

Cheyletus eruditus (Shrank) (Prostigmata: Cheyletidae) was observed in 9 of the 18 grain silos. This predatory species is associated with populations of *A. siro* and *Lepidoglyphus destructor* (Shrank). In natural conditions, their populations are not able to effectively control the presence of pest mites. *C. eruditus* is observed in great number in nests of birds.

L. destructor (Astigmata: Glycyphagidae) was present in 5 silos. It is frequently present in cereal storage and is associated with grain debris and dust (17). Damage caused by the presence of this mite is due to fungus spore propagation and to the presence of exuvia, corpses and dejections. Direct attacks on the grain seem to be rare.

Tarsonemus sp. (Prostigmata: Tarsonemidae) and *Tyrophagus putrescentiae* (Shrank) (Astigmata: Acaridae) are generally associated with fungi such as *Penicillium* sp. and *Aspergillus* sp. Their presence is linked to high humidity around the grain silos. It is

important to note that even if *T. putrescentiae* is often considered as a fungivore, it is able to be nourished and to develop as a predator (18).

Glycyphagus domesticus (De Geer) (Astigmata: Glycyphagidae) was found in a single location. This species is a typical fungivore (19), generally observed in humid habitats.

These six species belong to two orders and four families. Four of these six species are considered as frequently observed in British and Hungarian cereal storages (*A. siro*, *T. putrescentiae*, *L. destructor*, *C. eruditus*) and three in Polish cereal storages (*A. siro*, *L. destructor*, *C. eruditus*) (20). In mid-Belgium and during our sampling period, only *A. siro* and *C. eruditus* could be considered as common mites. The absence of mites from three stored places was not due to a low sample size. To explain this, we could hypothesize a recent chemical treatment, a better cleaning of the stores or the occurence of hot dry conditions which do not favour astigmatid mites.

Most previous studies have mainly considered mites present in the grain silos and until now, little attention has been paid to mites present around stored cereals. The advantage of this study is that it highlights the presence of mite hotspots around cereal silos during the month of June. These mites could contaminate new wheat stocks collected during the month of August.

From the medical point of view, *A. siro*, *G. domesticus*, *L. destructor*, *T. putrescentiae* are able to induce allergenic reactions in sensitized healthy people (rhinitis, dermatitis, asthma). The risk is especially significant since the number of mites present in the grain storages can be elevated to several millions. Research to evaluate the degree of sensitivity of grain storage workers in Belgium to storage mites should be done. This could lead us to suggest new protection measures for the worker. Further research on the effects of *Tarsonemus* sp. and *C. eruditus* is required to evaluate their allergenic potential.

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REFERENCES

1. HUGHES, A.M. (1976) – The mites of stored food and houses. Ministry of Agriculture, Fisheries and Food. Technical bulletin n° 9, London : 400 p.
2. O'CONNOR, B.M. (1979) – Evolutionary origins of astigmatid mites inhabiting stored products. *In*: Rodriguez, J.G. (ed.) *Recent advances in Acarology*. Academic press, New York, Vol. 1 : 273-278.
3. SINHA, R.N. & H.A.H. WALLACE (1966) – Association of granary mites and seed-borne fungi in stored grain and outdoor and indoor habitats. *Ann. Entomol. Soc. Amer.*, **59**(6) : 1170-1181
4. ZDARKOVA, E. (1991) – Stored product acarology. *In* : DUSBABEK & BUKVA (eds.), *Modern Acarology*. Academia, Prague and SPB Academic Publishing bv, The Hague, Vol. 1 : 211-218.
5. ANGRISANO, A., L. DI BERARDINO, A. FREGOSO, G. ZATTA, G. BAGLIANI & R. COMPOSTELLA (1990) – *Dermatophagoides* and storage mites: Statistical analysis of RAST results. *Ann. Allergy*, **64**(4) : 358-361.
6. REVSBECH, P. & M. DUENOLM (1990) – Storage mite allergy among bakers. *Allergy*, **45**(3) : 204-208.

7. VAN HAGE-HAMSTEN, M. & S.G.O. JOHANSSON (1992) – Storage mites. *Exp. Appl. Acarol.*, **16**(1-2) : 117-128.

8. FAIN, A. (1971) – Notes sur les acariens des denrées alimentaires à Kinshasa (R. D. du Congo). *Rev. Zool. Bot. Afr.*, **84** : 175-183.

9. TSENG, Y.H. (1979) – Studies on the mites infesting stored food products on Taiwan. *In*: Rodriguez, J.G. (ed.), *Recent advances in Acarology*. Academic press, New York, Vol. 1 : 311-316.

10. PAGLIRINI, N. (1979) – Studies on the mites of stored cereals in Yugoslavia.: *In*: Rodriguez, J.G. (ed.), *Recent advances in Acarology*. Academic press, New York, Vol. 1 : 305-309.

11. LUNG-SHU, L. (1984) – Stored grain mites in China: Their distribution and effects. *In* : D. A. Griffiths, and C.E. Bowman (eds.), *Acarology VI*. Ellis Horwood, Chichester, Vol. 2 : 1002-1005.

12. LOZZIA, G.C., F. OTTOBONI, I.E. RIGAMONTI & P. ROTA (1994) – Hay mites in Italy. *Boll. Zool. agr. Bachic.* Ser. II, **26**(2) : 231-240.

13. GRIFFITHS, D.A., D.R. WILKIN, B.J. SOUTHGATE & S.M. LYNCH (1976) – A survey of mites in bulk grain stored on farms in England and Wales. *Ann. Appl. Biol.*, **82**(1) : 180-185.

14. VAN DEN BRUEL, W.E. & D. BOLLAERT (1956) – Une des principales causes de détérioration des stocks de grains: La pullulation des acariens. *Revue de l'agriculture*, **9** : 304 - 315.

15. WILKIN, D.R. (1973) – Resitance to lindane in *Acarus siro* from an english cheese store. *J. stored Prod. Res.*, **9** : 101 - 104.

16. WILKIN, D.R. & L.M. STABLES (1985) – The effects of dusts containing etrimfos, methacrifos or pirimiphos-methyl on mites in the surface layers of stored barley. *Exp. Appl. Acarol.*, **1** : 203-211.

17. SINHA, R.N. & J.T. MILLS (1968) – Feeding and reproduction of the grain mite and the mushroom mite on some species of *Penicillium*. J. Econ. Ent., **61(6)** : 1548-1552.

18. BRUST, G.E. & G.J. HOUSE (1988) – A study of *Tyrophagus putrescentiae* (Acari: Acaridae) as a facultative predator of southern Corn Rootworm eggs. *Exp. Appl. Acarol.*, **4** : 335-344.

19. BOWMAN, C.E. (1984) – Comparative enzymology of economically important astigmatid mites. *In* : D. A. Griffiths, and C.E. Bowman (eds.). *Acarology VI*. Ellis Horwood, Chichester, Vol. 2: 993-1001.

20. SINHA, R.N. (1979) – Role of acarina in the stored grain ecosystem. *In*: Rodriguez, J.G. (ed.), *Recent advances in Acarology*. Academic press, New York, Vol. 1 : 263-272.