

**TETRANEURA ULMI LINNAEUS, 1758 (HOMOPTERA, APHIDIDAE) ON ELM  
(ULMUS PUMILA) AS ITS PRIMARY PEST**

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**ABSTRACT**

*The aphid Tetraneura ulmi causes a fig like gall to be formed on certain species of elm. T. ulmi is widely distributed Euro-Asian species which was secondarily introduced into North America. It attacks numerous species of elm. In Mongolia particularly Ulmus pumilla. The research was carried out in 2014 in the garden field (J.Sambu named after the street, S.Zorig garden ) city of Ulaanbaatar. The observations were concerned with Ulmus pumila that grow in the garden that is located in the city centre.*

**KEY WORDS:** *Tetraneura ulmi*, elm, gall development

**INTRODUCTION**

All over the world so far over 4000 aphid species have been recorded, of which 700 make galls on coniferous and deciduous trees. On elm leaves galls are formed by 6 host alternating aphid species from the *Eroismatinae* family. *Tetraneura ulmi* is one of those species and is widely spread across Asia and Europe and it migrates from elms onto grass roots [4].

Fundatrices were light green, slightly waxed and deprived of siphunculi. One fundatrix made only one gall in which it developed and fed along with its offspring. The development of aphids of the first generation involved 4 larvae stages. Fundatrices hatched from 15 April to 7 May. Through the areal

sucking on the abaxial face of leaves, they damaged on average 1.4 cm<sup>2</sup> (about 6%) of the leaf blade, in leaves with 10 and more galls often the whole blade. Whiting 3-4 weeks from hatching (from mid May), fundatrices matured and during 1-3 weeks they produced on average 35.2 fundatrigeniae. At the beginning of June, galls reached 10.8 mm in length and 6.2 mm in width. Fundatrigeniae developed about 18 days and from 10-30 June they formed migrants alatae [3].

**Taxonomy:**

*Homoptera-Aphidoidea-Aphididae Eroismatini – Tetraneura*

## METHODS AND MATERIAL SECTION

Field and laboratory studies were systematically carried out on *U. pumilla* in 2014. From first decade of June to third decade of June leaves with galls

were taken species in 5 days intervals for laboratory investigations.



Figure 1. Fundatrices.



Figure 2. Fig gall (4 galls in one leaf).

Photo by Munkhtsetseg.B

In 4 main inspection dates, in total 1000 leaves with 1550 galls were analyzed in detail, in each of samplings on average 250 leaves and 115.3 galls. A sample consisted of 50 leaves collected from 1 tree. In the laboratory, damaged leaves and the number of galls on one leaf were counted. With the use of hand microscope 'Escope' precise measurement of galls were made (height and width in the widest place) and then aphids that present on them were counted. Their identification was made on the basis of papers

by Katarzyna Kmiec, Izabela Kot. We used daily temperature norm (from May to October in 2014). To evaluate the monthly or daily air temperature and precipitations of plant growing season and we would plot the growth and gall development period. As a result of such investigations it can be detect a summa effective temperature of gall development period of elm gall aphid. The summa effective temperature can be calculated using the following formula: (Bei-Bienko, 1966).

$$K_1 = n \cdot (t - C)$$

C - minimum threshold of temperature to start their development

t - air temperature during the period that the insect starting its development

n-number of days which are required for development of one stage.

## RESULTS

During research time we counted number of galls and aphids from 5<sup>th</sup> to 20<sup>th</sup> June in 5 days intervals. Damaged leaves contained from 1 to 8 galls were recorded, average number of galls in one leaf 1.06-

1.9 individual. The average number of aphids in one gall in the year of research was similar amounted to 4-22 individual (Table 1).

Table 1

The number of *Tetraneura ulmi* on elm (*Ulmus pumila*) in June. 2014.

№	Date of observation	Number of trees	Total number leaves with galls	Total number of galls	Number of galls in one leaves	Average number galls in one leave	Total number of aphids	Average number of aphids in one gall
1	VI.5	5	250	267	1-2	1.06	1068	4.0
2	VI.10	5	250	352	1-5	1.4	5632	16.0
3	VI.15	5	250	470	1-8	1.9	10340	22.0
4	VI.20	5	250	461/184	1-8	1.8	3496	19.0

**The development of fundatrices;** *T.ulmi* winters in the stage of fertilized eggs laid by females of the sexuales generation at the end of summer and at the beginning of autumn. As mentioned above, apterous viriginigen generations can also winter on roots of secondary host. Larvae of the 1<sup>st</sup> instar of fundatrices hatch from eggs placed in fissures and other hidden

places on the bark of stems and large-diameter branches of elms in spring of the next year [ ]. We determined gall development period in UB condition of Mongolia. As a result of fundatrix made galls first of June and in the third decade of June winged migrants left the gall (Figure 1). Period of cracks of galls continued about 8 days.

VI															
day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Stage of aphid	○	○	○	○	○	○	○	○							
				~	~	~	~	~	~	~	~	~	~	~	~
Period of fundatrix made galls															
VI															
day	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Stage of aphid	~	~	~												
	+	+	+	+	+	+	+	+							
Period of cracks of galls															

Figure 1. Gall development period of elm gall aphid (*Tetraneura ulmi*) 2014 (V.29-VI.23)

larvae ~ Fundatrix in gall ○ Migrants +

We determined the summa effective temperature for gall development period in natural condition. The result has shown that the gall development take

around 23 days, and it's summa effective temperature was 39.1C° (Table 2).

Table 2

Summa effective temperature and precipitation on gall development period				
Stage	2014	Date (days)	Ta C <sup>0</sup>	RRmm
Gall development period	VI/1 VI/23	23	14.7	39.3
Summa effective temperature			39.1	

The size of galls had an imported effect on the number of aphids. For instance, in the gall the height of which was 9.0-10.7mm the average number of

aphids was higher than in galls the height of which was 6.1-8.8mm (Table 3).

Table 3

The number of *Tetraneura ulmi* depending on gall developmental stage in June, 2014

Number of galls	Height of galls (mm)	The highest number of aphids in one gall (ind.)	An average number of aphid (ind./gall)	Width of galls in the widest part of them (mm)	The highest number of aphids on one gall (ind.)	An average of aphids (ind./gall)
	<6.0			<3.2		
50	6.1-8.8	20	14	3.3-4.9	31	19
50	9.0-10.7	36	21	5.2-6.1	40	23
	>11.0			>6.2		

## DISCUSSION

In the literature *T.ulmi* is mentioned at least in 10 species of elm, in Europe most frequently in *Ulmus glabra* Huds. And *U.minor* Mill. *T.ulmi* ranks

among a economically important family *Pemphigidae* which is represented by about 30 species.

## CONCLUSIONS

- In the spring *T.ulmi* fed on elm (*U.pumilla*) trees of the research year in the garden that is located in the city centre.
- In UB condition fundatrix made gall beginning of first of June. Their development lasted for 23 days in gall and it's summa effective temperature was 39.1C<sup>0</sup>.
- Fecundity of fundatrices ranged from 4 to 22 larvae. On damaged leaves from 1 to 8 galls were recorded, average number of aphids in one gall 4-22 individual (Table 1).

## REFERENCES

- Coombes "Trees Allen" DK Publishing, Inc New York, NV 1992
- HR.Wong J.C.E.Melvin, A.M.Harper "Common insect and mite gall of the Canadian Prairies" 1977.
- J.Urban. Bionomics and harmfulness of *Tetraneura ulmi* (L.) (*Aphidinea*, *Pemphigidae*) in elms. Journal of Forest science, 49.2003(4); 159-181.
- Katarzyna Kmiek, Izabela Kot. *Tetraneura ulmi* (L.) (*Hemiptera*, *Eriosmatinae*) on elm as its primary host. Aphids and other Hemipterous insects. Vol.13.145-149.