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The spatial distribution of the praticolous thrips species (Insecta: Thysanoptera)

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Rezumat

Distribuţia spaţială a speciilor de thripşi praticoli (Insecta:Thysanoptera)

Se mentionează pentru prima dată în lume faptul că, la speciile de thripşi recoltaţi prin metoda cosirii cu fileul şsi a scuturării plantelor înflorite, tipul de distribuţie spatială este cel binomial negativ, având la unele specii tendinţa de trecere către seriile logaritmice.

Abstract

It is mentioned for the first time that, for the thrips species harvested in the meadows of the Gârbova Massif, by the sweeping and by the bloomed plants shaking method, the distribution belongs to the negative binomial type and for some species, it has the tendency to go towards the logarithmic series.

Keywords: Thysanoptera, spatial distribution, sweeping, shaking method

The thrips spatial distribution was studied only by LEWIS (1975) who considers the logarithmic series characteristic for the thrips species.

Material and methods

The thysanoptera ecological study in stationary has been studied for 3 years in 6 secondary meadow sites, situated at altitudes between 800 - 1,500 m, in the Gârbova Massif.

The sites situated at 800 m, 900 m, 1,050 m and 1,200 m are characterized by the association *Festuco rubrae-Agrostetum capillaris* HORV. 51, the one situated at 1,400 m by the *Hieracio rotundati-Piceetum abietis* PAWL. & BR.-BL. 39 association and the one from 1,500 m belongs to the *Violo declinatae-Nardetum* SIMON 66 association (fig. 1).

The thrips were collected by sweeping and by the blooming plants shaking method, the number of samples being determined statistically, with a precision of 80%.

One of the main problems raised by any study of the populations structure and dynamics is the precision with which the collecting method estimates the effectives, namely to what extent the calculated number of samples allows a numerical appreciation of the organisms, as close to the effective existent in nature, as possible, taking also into account their biological characteristics.

The number of collected samples depends on several factors, namely on the precision degree with which we work and on the type of spatial distribution of the studied group of organisms.

To determin the thysanoptera spatial distribution pattern we utilised the BLISS & FISHER supradispersal index, representing the proportion between the variation and the mean, its value being supraunitarian, the thysanopteras were considered to correspond to the grouped pattern of distribution.

Since the aggregated distribution is characterized by several types of spatial distribution, the negative binominal type (known in the case of many groups of soil fauna) was tested with the help of a QBAS program.

Depending on the K factor and on the mean value, the following formulas can be applied:

$$K = \frac{\bar{x}^2}{S^2 - x} \text{ or } \log \frac{N}{n_0} = k_2 \log\left(\frac{1+\bar{x}}{k}\right) \text{ (after}$$

SOUTHWOOD 1966)

with which we can determin an approximate value of K, that is afterwards introduced in the formula:

$$N\ln\left(1+\frac{\bar{x}}{k}\right) = \sum\left(\frac{Ax}{k+x}\right)$$

the testing of the theoretical distribution is done by χ^2 test (with n-3 degrees of liberty).

The terms of the negative binominal were calculated based on the following formula:

$$P_{(x)} = \left(1+\frac{\mu}{k}\right)^{-k} \frac{(k+x-1)!}{x!(k-1)!}\left(\frac{\mu}{\mu+k}\right)^{x}$$

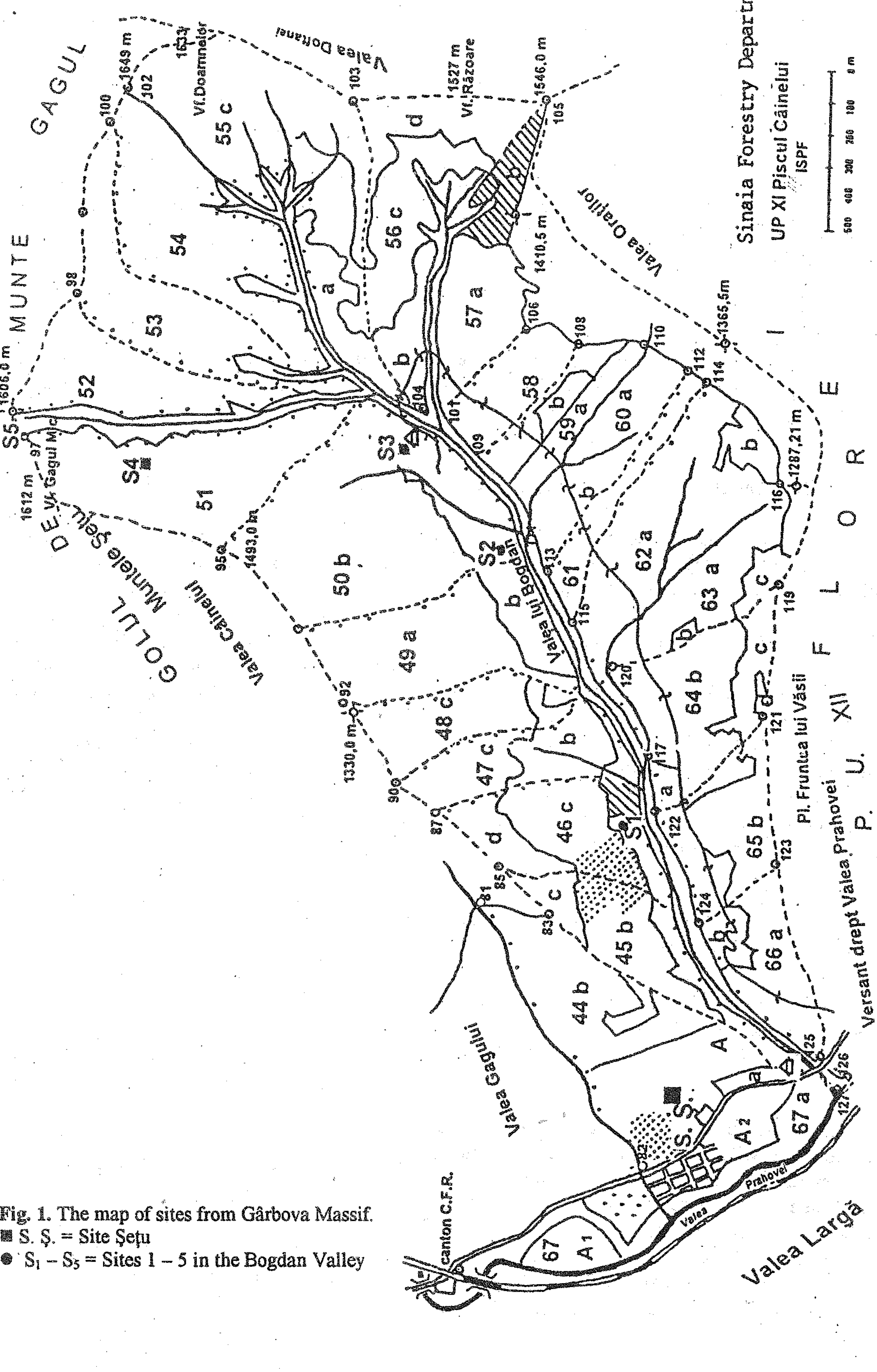

Fig. 1. The map of sites from Gârbova Massif.
■ S. Ş. = Site Şeţu
● $S_1 - S_5$ = Sites 1 – 5 in the Bogdan Valley

$P(x)$ is the probability of having 0. 1. 2.... individuals in the sample unity. Multiplying every probability by the sample quantity (n) we obtain the frequency distribution [nP(x)].

Since our material fits the negative binomial type of spatial distribution, the necessary number of samples was correlated with the mean of the number of individuals and with the K parameter at a precision level of 80%.

Results and discutions

The supraunitary value of the supradispersal Bliss and Fisher index, the ratio between the variant and the mean, shows an aggregated distribution of the thrips species (table no. 1).

The testing of the negative binomial spatial distribution was done for 9 of the dominant thrips species, sampled during the 3 years, with the help of the 2 methods.

There can be noticed a differentiation of the K values, higher for the species sampled with the sweeping net than for those collected by the shaking method, which is explainable taking into account the method itself, which achieves an accumulation of the individuals that live on a large area.

The K values are generally low and very low, the lowest ones of 0.081 and 0.042 show tendencies of the negative binomial distribution to turn into the logarithmic series.

The highest K values are reached in the case of the species for which the negative binomial distribution has a very low probability of conformity with the model in three cases from the 16 studied. For 5 species, the probability is good and for 7 species it has been proven that the negative binomial distribution has a very high probability of conformity with the model (χ^2 with α higer than 80%): *Aeolothrips intermedius* and *Chirothrips manicatus* by the sweeping method (I[st] year), *Haplothrips niger* and *Frankliniella intonsa* by the shaking method (I[st] year), *Taeniothrips picipes*, *Haplothrips niger* and *Frankliniella intonsa* by the shaking method (II[nd] year).

Thus, the negative binomial distribution type characterizes the thrips collected by both methods, in the Gârbova Massif, in the case of certain species displaying a tendency towards the logarithmic series.

Conclusions

At the praticolous thrips species from the Gârbova Massif we have pointed out an aggregated distribution.

Most of the species belong to the negative binomial type of distribution.

At the *Thrips physapus* and *Haplothrips niger* species, sampled by the shaking method we have pointed out a tendency of the negative binomial distribution to turn into the logarithmic series, due to K's very low values.

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Table no. 1.

The negative binominal distribution of the dominant thrips species from the Gârbova Massif. Characteristic values, likelihood of conformity

Species	method	year	$\bar{X}$	S^2	K	$\bar{\chi}^2$	Degrees of liberty	α Probability	Observations
Aeolothrips intermedius	sweeping	I	0.827	1.65	0.6335	1.283	4	0.90 - 1.069 0.80 - 1.649	v.h.
Chirothrips manicatus	sweeping	I	3.93	95.5	0.284	12.07	16	0.80 - 11.15 0.70 - 12.62	v.h.
Aeolothrips intermedius	sweeping	II	0.379	0.841	0.494	1.57	2	0.50 - 1.386 0.30 - 2.41	h.
Aeolothrips intermedius	sweeping	III	1.20	4.50	0.96	22.0	6	0.01 - 22.5	v.l.
Chirothrips manicatus	sweeping	II	1.46	13.29	0.1396	13.31	10	0.30 - 11.78 0.20 - 13.44	l.
Haplothrips niger	shaking	I	2.59	87.41	0.0895	3.155	5	0.70 - 3.00 0.50 - 4.35	v.h.
Thrips physapus	shaking	I	1.611	31.17	0.081	0.627	4	0.98 - 0.429 0.95 - 0.711	v.h.
Frankliniella intonsa	shaking	I	2.49	38.2	0.2425	9.04	12	0.70 - 9.03 0.50 - 11.34	v.h.
Thrips physapus	shaking	II	2.5	16.84	0.7645	26.87	12	0.01 - 26.2 0.001- 32.9	v.l.
Taeniothrips picipes	shaking	II	0.60	2.11	0.227	4.016	5	0.70 - 3.0 0.50 - 4.35	v.h.
Haplothrips niger	shaking	II	3.08	142.0	0.042	0.419	2	0.90 - 0.211 0.80 - 0.446	v.h.
Frankliniella intonsa	shaking	II	1.62	4.97	0.688	2.957	7	0.90 - 2.83 0.80 - 3.82	v.h.
Aeolothrips intermedius	shaking	II	0.717	4.557	0.1708	6.65	6	0.50 - 5.35 0.30 - 7.23	h.
Thrips tabaci	shaking	II	1.037	8.984	0.908	10.89	8	0.30 - 9.52 0.20 - 11.03	l.
Haplothrips angusticornis	shaking	III	1.47	11.86	1.503	20.04	10	0.05 - 18.31 0.02 - 21.2	v.l.
Odontothrips loti	shaking	III	1.083	3.49	0.4565	7.094	7	0.5 - 6.35 0.3 - 8.38	h.

v.h.	= very high conformity	l.	= low conformity
h.	= high conformity	v.l.	= very low conformity