Tiscia (Szeged) Vol. XVII, pp. 199—205 (1982)

FEEDING ECOLOGICAL INVESTIGATIONS IN THE DISTRICT OF THE NATURE CONSERVATION-AREA MÁRTÉLY—KÖRTVÉLYES

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(Received 5 October, 1981)

Abstract

We have settled graet tits *(Parus maior* L.*)*, blue titmouses *(Parus caerulues* L.) and tree-sparrows *(Passer montanus* L.*)* with the help of artificial nest-holes in the poplar plantation of the Tisza flood plain in the nature conservation area of Mártély—Körtvélyes (Hungary). We examined the nest building, feeding biological relations of these three species.

We stated that the individuals of the settled species used the most advantageous materials and Arthropods for nest building respectively as food from this surrounding.

All the three species fed their youngs on Noctuid larvae and imagos.

Food of tree-sparrows didn't differ in species only in variety from that of the two titmouses.

Bird settlements with the help of artificial nest-holes served unanimously the decimetion of insect pests in monocultural tree plantations.

Raising of the problem

The face of the earth goes over radical changes under the influence of human activity. In consideration of economical factors being determinant also on nature conservancy areas, there is no other choice for rational, nature enthusiastic specialists as to look for those resolutions — between the limits of our present and future economical development —, wich can effect the nature advantageously to a certain extent.

We choose of the investigation of bird relations of artificial poplar forests upon such considerations near 10 years ago.

Birds are indicators of nature conservation — wrote A. KEVE (1965). They — as the most sensitive seizmographs to environmental changes — indicate only subsequently the deterioration of something irredeemably as the result of human activity with altering their course or with their perishing. Birds and plants form an inseparable connection in the nature. This unambigouos unity is at separated in favour of greater financial income.

More and more intensive plants are imprtovled and these tree types growing quikly and their plant associations can be considered not as forests but as plantations. A poplar plantation grows ready for cutting on a right place during 20 years. Birds aren't able to immigrate into these plantations so speedily. For avoiding this the settlement of artificial nest-holes can be a good solution.

Aims and motivation

We tried to promote the settlement first of all of great tits with the help of artificial nest-holes. We thought, if we can localize great tits with artificial nest-holes, at least for the time of hatching, we can determine the interrelation of this species to the given environment with neck-ringig method made on youngs.

Examined area

We began to settle artificial nest-holes upon the request of the Committee of Hungarian Academy of Sciences at Szeged, in the surrounding of the Tisza reach at Mártély—Körtvélyes. At setting out the first lo nest-holes we could approach

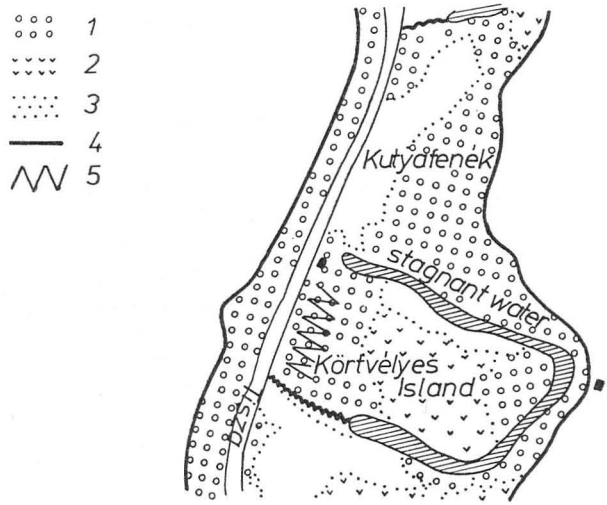

Fig. 1. Examined area in Körtvélyes island: agricultural area; dike; willow-poplar gallery-fore and planted poplar; examined area

the territory only by boat from the side of Vásárhely, because of the high water level in early spring of 1971. At high water only the waterside zone remains dry, so the first and the later nest-holes were also settled parallel to the living Tisza river, on the treetrunks, 100 meters far in the forest, with south-western flying hole. The planted stand consists of poplar respectively of a few maple-leafed platans. The plantation is edged by earth way from the direction of the Tisza. On the side lieing toward the Tisza. On the side lieing toward the Tisza indigenous poplars, willows, Italian pop- l ars and an acacia hedge are grown from the seeds and fruits transported by the water. In the first years only dewberry occured as underwood. Later on — mainly owing to the glades and decimations formed by the thining of tree stands — a nearly impassable thicket of acacia rose. Condition of the ground is damaged also by the current of the river wich beats down the underwood at high waters averagely three times in a year. This was the destiny of the stand planted later on the examined, 1 km long part on the occasion of the high flood in 1970.

The used nest-hole types

I have brought the first hole type from the Ornithological Institute of Hiddensee, ÁDR. This type was modified on the ground of our later experiences. Recently we use holes known from Neschwitz (GDR). Its advantage is, that its closing device

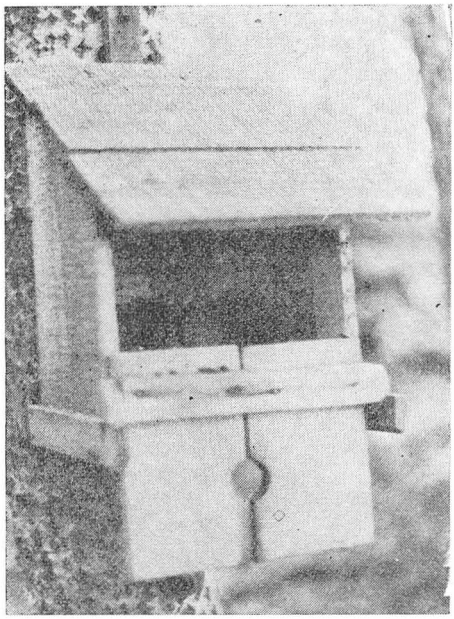

Fig. 2. Nest-hole type from Hiddensee

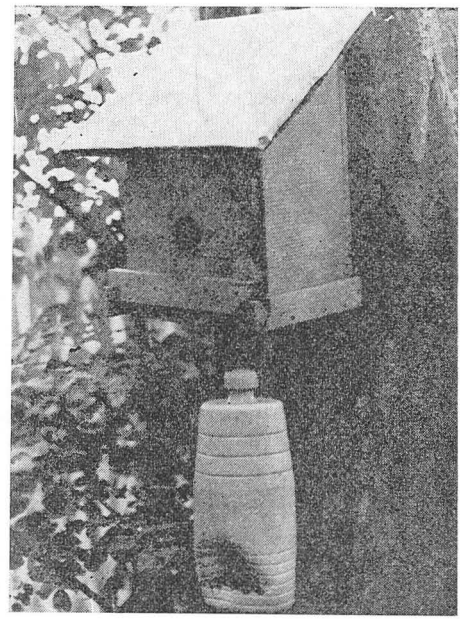

Fig. 3. Tempting feeding on the hole settlement

can not be lifted and carried along by the water at a high water level. For comparison three westgerman facement hole can be found on the territory and also some holes with magnesite basic material made for my suggestions by the Visegrád Parkforest Farm. The usefulness of these holes will be detailed at the discussion of nesting relations.

Periods of investigations

There were monthly hole-visits between 1974—81, and crop-content examinations from May to August. It is characteristic of the examinations' difficulty that during the seven years there were 18 times high water in hatching time. At such a time we could control the holes and take samples only from a boat.

Occupation of holes and nest building

To promote the occupation we used two methods. Partly in favour of winter feeding we put sunflower-seeds in plastic flacons on the nest-holes.

Occupation of new nest-holes was prosperously influenced by the autumnal setting out while recognition of winter hiding-places promoted the rise of nesting number. The next table shows the change in number of holes through nesting time.

The number of holes is decreasing because of the extremely high humidity from

year to year. At the beginning we used plastic foil for covering holes. That must be changed in every year. Later we covered the top of holes as well as the upper part of lath with painted aluminium foil, fixing the hole to the tree trunk.

With this method it can be attained to use the holes — made of 2 cm thick deal impregnated with xyladecor — also ten years long. The number of holes was decreased by wilfull damage as well as by the forest thinning works. For this reason 25 holes went wrong during eight years.

Related to holes settled in other forest-types woodpeckers made less damage here. Presumably this rapodly growing tree species, foreign to this land is unfavourable for insects, too. The wood-cement holes with round surface proved to be the best among the settled ones for nesting of great tits. For this reason we fasten compact, triangular logs into the corner of the wooden holes with angular surface.

The sheltered corners of holes are used by different Arthropods for hiding and pupation places from autumn to spring. These Arthropods are: carabid beetles, spiders, caterpillars, their pupas and egg-cocoons. Nest-holes staying empty all the year are settlements for carabid beetles and spiders. The occupied holes are free from intruders. We have placed a biostrip piece into the upper corner inside the hole inaccessible for birds for keeping off pests and intruders. We experienced that owing to this method there can be find no bird-lices, no wooly aphids, no ticks in the nest-holes. Subseguetly youngs can develop better and they become stronger. The above mentioned method is proved also by the bird fanciers' experience of several years.

The nest predator activity of small mammals couldn't be observed in this flood-plain poplar plantation. Probably it is not a favourable hunting-ground for them because of the often water cover wich decreases the number of animals living on and in the ground.

Occupation of nest-holes begins with resting there by night already in winter respectively in early spring. The main hatching time is in the fourth and fifth monthes but hatching pairs can be found rarely still in the seventh month.

Nest building begins with laying the foundation. Mainly moss and fine-stapled grass are used by great tits and they line the nest with deer-hair. Deer-hair has a long, fibrous, tubular structure what seems to be very suitable for liming the nest. This material is plenty available for great tits. Flood of the river affects this fact particularly. The investigated area being nearest to the river-bed is laying the highest. At inundations the part of flood-plain laying nearest to dikes is getting saturated first and so rises the water level on the side of the living river. This is the reason of wild animals' getting stuck in the holm, in the 3 km wide flood plain and their spring-shedding goes on in the district of the hole-settlement. These sloughed hair packs laying all over are used for nest-building by great tits. We tested their quick react to the presence of materials wich can be used for nest building. We experienced that cotton-wool placed out appears in the upper moss layer an hour later.

As it appears from the table 1. at the beginning a lot of tree-sparrows tried to build a nest. Sparrows nesting regularly in couples were collected together and put in linen bags during evening controls and they were taken ten km far away and released there. From such a distance they couldn't return to the hole-settlement. That could be controlled by placeing coloured plastic rings on.

The high flood levels of 1980 lifted and sept away the doors of more holes. In two of the 20 holes wich became opened so, settled redstars. This experience was used for widening the possibilities of nesting. To avoid the endangering of holes by high waters we switched over to Neschwitz hole-type. The hole cover of that can not be lifted by floods.

Table 1. *Number of bird couples hatching in the nest-hole settlement at Körtvélyes during the eight years of the investigations*

Year	Total number of holes in a year	Great tit	Blue tit	Tree sparrow	Total settled holes
1974	45	9	1	1	11
1975	75	16	—	10	26
1976	75	17	1	5	23
1977	70	17	1	5	23
1978	65	16	—	5	21
1979	60	14	1	2	17
1980	56	13	—	3	16
1981	50	12	—	5	17

Neck-ringing method and its results

Food samples can be collected among resident bird youngs by neck-ringing method. Youngs at the age of about 1—2 weeks are the most suitable for this investigation. Rings are made of tin-lead solder wire used in radio-technics since it is enough hexible but rigid at the same time. Youngs remain two hours long ringed when the food samples will be collected one by one with forceps into phials fulled with formalin. Labels are placed in every phial with the right data. Feeding activity was also examined at ringed and not ringed youngs, too, from a suitable distance without disturbing as it is possible. We experienced that feeding activity decreases at ringed youngs. Sulseguently the weight of food samples is less as that of notringed ones.

Food samples were produced by 290 crop content of 180 nests during eight years. The collected material made possible the determination of 120 insect individuals. (Table 2)

The percentage distribution of insect species found in the collected food samples is as follows:

Lepidoptera	25%	Araneidae	5,5%
Coleoptera	50%	Aphilididae	19,5%

The food consumption in two hours in the case of a young great tit is 370 mg on average in this poplar plantation between May and July. This value is equivalent with seven owlet-moth imagos wich are foraged without wings by the mother birds. The values mentioned above are given on the basis of crop-content samples. We emphasize repeatedly that the feeding intensity is decreasing in holes with youngs. Regrettable no better method is still known for feeding examinations of living birds. Our data are corresponding to the values measured by ROGENSE, BOUCHNER, KLUYVER (1951) and MANFRED (1959). It is remarkable that the two tit species and tree-sparrows feed the same food in this living-space. The intensity of feeding is changing depending on the age of youngs. They get food per minute till the age of one week though food pieces are small. In the age of 2—3 weeks youngs are fed in every fifth, tenth minute. By this time the size of food pieces is equivalent with a wingless imago of Noctuidae or with a Melasoma populi. In the case of plant- louse more specimens are fed at same time. Feeding intensity is the highest after taking flight when the whole tit-family flies from tree to tree. We experienced that bird parents give a food piece to their youngs during this period in every 5—10th second. The food collecting range is the smallest upto the youngs' age of one week, but never surpassed a circle with

Table 2. *Insects determined from the samples*

Parus major (great tit)			*Passer montanus* (tree-sparrow)		
results of crop content examinations of their youngs					
Group	Developmental stage	Total occurence	Group	Developmental stage	Total occurence
Noctuidae	larva	20	Noctuidae	larva	10
Noctuidae	imago	130			
Melasoma populi	larva	140			
Geometridae	imago	10			
Synaptus filiformis	imago	50	Synaptus filiformis	imago	10
Chrysomelidae	larva	50	Chrysomelidae	larva	40
Dorytomus longimanus	imago	70			
Aphidina	imago	150			
Curculionidea	larva	50			
Salticidae	imago	10			
Araneus	imago	30			
Lepidoptera	larva	10			
Satyridae	pupa	10			

50 meters radius during the time of staying in holes. This can be explained probably with the territory's richness in food. We used traps with ethylenglycol and made collectings with mets for making the identification of food samples easier. The species of food samples in comparision to the collected ones can be found totally convincing.

We were led in the spatial placing of holes — over and above the facts mentioned in the introduction by the next considerations: we placed the holes in groups of 4 respectively of 2 ones, 50—100 meters far from one an other, in the 1 km long and 100 m wide forest belt. The holes were placed one by one at the inner edge of the forest belt. We used a much higher density of holes as KLUYVER (1951) known from the literature. This was suitable for deciding the territory's supporting capacity. Moreover we could solve the problem of feeding in winter with the help of the surplus holes.

Immigration into the holes — except the initial time — was nearly constant and we found it to be 31%. Decrease of this value occured during those years when the holes were swamped by the flood of the Tisza. While during the time of a long lasting flood morl being lower than the level of holes, the number of hatching bird-couples was greater than during the period without inundation. The reason of that is: nests laying near the ground get flooded and therefore increased the occupation of artificial holes.

We found a greater density in the 20 m wide belt of the forest edge as in the zone of 20 to 100 meters. This phenomenon can be called edge-effect which is increasing proportionally with the age of hole-settlement.

During the investigated time period we could meet with an increase of Amorpha fructicosa, acacia stand inside the underwood and on its most dense places a decrease of hatching couples was to be found. We could observe the same at control samplings, too, that is the insect fauna of acacia stand is armer in number of species and individuals. Probably the strong volatile oil of the glandular hairs covering its leaves kepps

the insects away. A well recognizable connection can be found between the quality and fauna of forest as living-space. This appears also in this case as from the avicoenological works of LEGÁNY (1968) and others.

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Ornito-ökológiai vizsgálatok a Mártélyi Tájvédelmi Körzet térségében

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Kivonat

A körtvélyesi tájvédelmi körzet tiszai hullámterében kihelyezett mesterséges fészekoduk segítségével a nemesnyárfa erdőben széncinege — (Parus maxor) telepet hoztunk létre. Fiókáikon ligatúrás módszerrel táplálkozásbiológiai vizsgálatokat végeztünk. Vizsgáltuk ezen kívül a fészekodútelepen kialakult fészkek sűrűségét, s ezeknek ökológiai okait kerestük.

Megfigyeléseink azt igazolták, hogy az odútelepet nem csupán a széncinegék (Parus mayor) hanem a kékcinegék (Parus coeruleus) és mezei veréd (Passer montanus) betelepedték. Mindhárom faj fiókáin elvégeztük a begytartalom vizsgálatot. A kapott begyminták alapján identifikált rovarfajok majdnem teljesen megegyeztek.

A három faj által felhasznált rovarok a nemesnyárfa ültetvény legfontosabb kártevői közül kerültek ki. A begymintában e rovarok előfordulásának gyakorisága gradációjukkal egyenes arányt mutatott.

Megállapítottuk, hogy a fészkelő fajok táplálkozására és telepsűrűségére egyaránt hatással volt az aljnövényzet és a lombkoronaszint vegetációja. A gyalogakácos (Amorpha fruticosa) cserjeszintű erdőségben alacsonyabb volt a lakott fészekoduk száma.

A monokulturális erdőben a kártevő rovarok gradációinak csökkentésében a mesterséges fészekodú kihelyezésével a megtelepített széncinkék hathatós segítséget nyújtottak.

Ornito-ekološka istraživanja na području za ti enog okruga Mártély

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Abstrakt

U plantažnoj topolovoj šumi na plavnom području Tise, zaštićenog okruga Körtvélyes, uspostavljena je kolonija velike senice *(Parus mayor)* putem postavljenih gnezda. Na ptićima primenom ligature, izučana je biologija ishrane. Registrovano je takodje i gustina naseljenih gnezda u koloniji i traženo njihovo ekološko tumačenje. Utvrdjeno je da je koloniju postavljenih gnezda pored velike senice naselila i plava senica *(Parus coeruleus)* i poljski vrabac *(Passer montanus)*.

Determinacijom uzoraka insekatskog materijala u voljci, utvrdjeno je da se ptići ove tri vrste ishranjuju skoro istom hranom. Ove insekatske vrste predstavljaju na jznačajnije štetočine plantažnih topola. Utvrdjena čestoća prisutnosti ovih insekata u uzorcima je u pravoj srazmeri sa njihovom gradacijom.

Utvrdjeno je da je gustina naselja ovih gnezdarica i njihova ishrana u punoj zavisnosti od spratovnosti vegetacije. U sastojini sa prisustvom *Amorpha fruticosa* u spratu šiblja, gnezda su slabije bila naseljena.

U monokulturnim šumama naselje senica u postavljenim gnezdima ima značajnu ulogu u smanjivanju gradacije štetnih insekata.

ОРНИТОЛОГО-ЭКОЛОГИЧЕСКИЕ ИССЛЕДОВАНИЯ В ПРОСТОРЕ ПРИРОДООХОРОННОЙ ЗОНЕ МАРТЕЛЯ

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Резюме

В Кертвельешской заказнике, в тополевом лесу разливной территории реки Тисы при помощи искусственных дупловых гнезд удалось развести колонии синиц. Над птенцами этих птиц провели исследования их биологического питания. Одновременно провели исследование над причинами вознекновения густоты гнезд и экологические причины их образования.

Нам пришлосб убедится и в том, что колонии гнезд в дуплах заселили не только синица обыкновенная и голубая, то также полевой воробей. Проведено изучение содержимого зоба птенцов. По содержанию насекомых взятые желудочные пробы, были идентичными у всех трех видов птиц. Обнаруженные насекомые в желудках относятся к наиболее важным вредителям тополевых насаждений.

Насекомые в желудочных пробах птиц находятся в прямых отношениях с градиацией их встречаемости.

Определилось также, что на пищу и густоту, колонии гнездующихся птиц, большое влияние оказывал растительный подлесок, а также высота и ширина кроны деревьев.

В кустарниковых лесных ценозах с малым аморфы, дупла меньше были заняты птицами.

В монокультурных лесах, в уменьменной градации вредных насекомых путем размещения дупловых гнезд, население синиц производят значительную помощь.