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CIRCULATION IN MATERIALS, INDUCED BY THE COLONY OF THE ROOKS (CORVUS FRUGILEGUS L. 1758) AT SASÉR, IN THE PERIOD OF REPRODUCTION

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Abstract

In the nature conservation area of Sasér, lying at Hódmezővásárhely, on the left-hand bank of the Tisza, between river kms 197—199, in a mixed heronry, on the average 2.000 pairs of rooks nested in the period between 1952—1977. The rooks have fledged, by pairs, two offsprings. In the average value of the statistics of 26 years, between 1 March and 31 May, the rook stock of the colony consumed 30,120 kg food. 53 per cent of this contained vegetable matters, 28 per cent invertebrates, and 19 per cent the remains of vertebrates. 9 per cent of the food mass originates from the flood plain of the Tisza, 91 per cent from the 2 to 15 km district of the nesting colony.

Introduction

The debate concerning rook feeding is of the same age as the literature of applied ornithology. The problem was cleared in European relation for a long time by the comprehensive monographs of VERTSE (1943), RASKEVITCH—DOBROVOLSKI (1954), PINOVSKI (1956, 1959, 1959a), OSMOLOVSKAYA 1972), and GRODZINSKI (1976.)On the basis of their results, the main nourishment of the rooks of mixed feeding consisted of agricultural insect pests and their ecological role proved to be positive in the overwhelming part of the year. This picture of feeding became, however, essentially modified in the overchemicalized agricultural environs of the last decades. Owing to the regression of the field insect fauna, the rook more and more consumes grown palnts and, at the same time, it becomes raptorial, damaging in this way game-preserving and nature conservancy. This unfavourable experiance has induced further investigations. It is known from earlier analyses that in respect of choosing food, the rook is extremely plastic. From tiny lymphs-larvae up to young hares, from small seeds upt to the coarse vegetable debris, it consumes everything. A large part of its food is supplied by the agrarian environment of monoculture character and poor in coenoses. Under conditions like this, the method of feeding-investigation striving for details becomes theoretic in its character. From production-biological point of view it is more expressive to base on quantity and proportions of larger food-groups. I was led by this point of view in drawing up my paper.

In the nature conservation area of Sasér, lying in the Tisza flood-plain at Hódmezővásárhely, in a 70 to 80 years old poplar plantation, a rook colony developed in a mixed heronry, in 1952. The ecological conditions and bird associations of the

colony are detailed in my cited papers (STERBETZ 1972, 1975, 1977). The huge biomass of rooks raises the question, where the food of the bird of mixed eating is originating from and what nourishment groups it is composed of. I should like to answer these questions from the statistics of Twenty-six years.

Materials and Methiods

In the period 1952—1977, I conducted the quantitative survey of the rook stock, on the basis of recording it more than once a year. From the mean value' of this I have obtained the value of 1994 pairs, brought up to 2000 hatching pairs (4000 individuals). For establishing the nestling mortality, during 26 years I have performed several surveyings and, by reason of this, I take into account two fledged young birds, for a nest each. [1]RASKEVITCH—DOBROVOLSKI, 1953, in the neighbourhood of Rostov, under similar conditions, had taken into account 2.2 progenies). For calculating the biomass, I have got a mean value 440 ind/gr, after weighing 50 adult individuals. The hatching weight of nestlings is about 12 gr, at taking wing, about 300 gr. To their staying at the nest for a month, I have calculated 160 grammes as a mean value, taking into consideration the unequa dynamism of their rapid development. In March and April, I took only into account the biomass of adult rooks, in May that of the adult and juvenile rooks. The number of nestlings in April is still unimportant, practically negligible. In the first days of June, the rook colony already disperses. The value of biomass is given by the product of the multiplication of the mean weight calculated for a single bird and the individual number established in the month in question.

The distribution on the foraging areas and the formation of the radius of action of rooks were solved by a car, following the bevies of birds, starting from the nesting communities in the small hours of the morning. The data forming the basis of calculations are here, as well, the mean values of 26 years.

At calculating the consumed food mass, there were evaluated in March and April only the biomass of adult individuals, in May, however, already that of nestlings, as well. The rooks, stayed at their alimentary areas from dawn until 10—11 o' clock, then from 15 o'clock until sunset. For getting saturated gastric contents, collections were always carried out in the late morning and evening hours. Because of the saturations two times a day, I always calcuated with the double of foodweight. I have multiplied this value with the individual number of rook quantity. The calculation of the foodmass of nestlings is complicated by the fact that their receptivity considerably changes every five or six days. At the beginning, the male is only feeding on 8 to 10 occassions. In about the third week, both parents already take part in bringing feeding stuffs and the number of feedings rises to 20 to 25. From the collections including the full period of the rearing of nestlings, a mean value was calculated in order to establish the average nestling foodweight. Calculating this value for two nestlings for each nest, I have multiplied it with the individual number of nestlings. The nestlings were always collected in the minutes following feeding, for the sake of getting saturated gastric contents. The daily foodweight falling on a single rook gave, in case of adult individuals, in March 70, in April 65, in May 65 gr mean values. In case of nestlings, the mean value in May was 50 gr.

I have to mention a possible fault at calculations and qualitative evaluations which is particularly important from practical point of view. The egg-destroying activity of rooks has been proved by a large number of observations all over Europe. But the degree of this cannot be demonstrated numerically. I have often observed in the rook colony of the Sasér, as well, that the rooks brought eggs of *Phasianus colchicus, Perdix perdix, Anas platyrhynchos, Fulica atra* and other unrecognizes eggs to their youngs. From the egg-shell debris accumulated below the nest or from the eggmass found in the gastric contents, anyway, the fact of occurrence could only be established.

I could not find any proper method for establishing the numerical amount of rook droppings either. According to JIRSIK(1952), among the omnivorous, very plastic rooks there occur sometimes some extremely specialized individuals which are, independently of the character of the feeding area, either extreme herbivores or carnivores. The formation of the weight and quality of the undigested food can be considerably influenced by composition and state of the matters taken in, the daily movement-intensity of birds, the trace elements taking place in the food, etc. Taking all these into consideration, in case of rooks, we may not expect generalizable results from weighing the products of any individuals held in captivity. At the fish-pond feed-mixture of domestic ducks consisting of vegetable matters, BALOGH (in: KANIZSAI—MITTELSTILLER 1969) calculated 5 kg excretion to 8 kg food. In case of wild-geese mostly fed with the vegetative parts of plants, KEAR (1963) calculated some values corresponding to 0.03—0.04 per cent of bodyweight for the daily excrete production in dried state. In case of insecti- and carnivorous birds, this value must be considerably lower. In this respect, however, there were not be available any literary data for me.

Results

The stock of the rook colony in the Sasér, in the average of the years 1957—1977, there were 2000 nesting pairs (4000 individuals), and for each pair two — altogether 4000 — fledged nestlings. The maximum value of the biomass in May was 2076kg. At the colony, in March and April there were only staying adult, but in May adult and juvenile individuals. In the first days of June the colony was dissolved.

The daily food requirements of rooks belonging to the colony were: in March 280, in April 260, in May 440 kg. This food requirement is in March 16, in April 14, in May 21 per cent of the biomass. The distribution of percentages is reflecting the increased food requirements of the developing nestlings. The dwellers of the colony consume altogether 20 120 kg food in the 92 day long reproductive period. 53 per cent of this foodmass is composed by vegetable matters, 28 per cent by invertebrates, and 19 per cent by the remains of vertebrates. A numerical demonstration of the destruction of a surely considerable amount of eggs was not possible.

The feeding action-radius takes place in the 2 to 15 km district of the nesting place. According to the Table containing the distribution of rooks, there originates only about 9 per cent of food from the flood-plain environment. 91 per cent originates from the agricultural areas lying outside the Tisza dams.

The excrete of the nestlings of the rook colony in the Sasér region, gets back in its full mass on the soil of the nesting site. A large part of the droppings originating from the afternoon food-intake of the adult individuals are also discharged in the nesting colony. The dropping mass originating from the gastrict contents filled in the morning, on the other hand, gets back into the environment generally far from the nesting colony, taking into consideration that the search for food then lasts for a longer time. The mass of the concentrated rook droppings, accumulated in the nesting colony, together with the excrete of herons nesting also there, eradicates the vegatation. Its ecological part is, therefore, unambiguously negative.

The food mass, grouped and expressed in weight values, is referring to that the feeding of rook populations, concentrated in colonies, raises serious problems in the agricultural ecosystems or those standing under nature conservation.

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Table 1. *Formation of the stock of a rook colony the in Sasér area in the reproductive periods between 1952 and 1977*

Year	No of. rook pairs (III—IV—V)	No. of nestlings (V)	Biomas kg March	April	May
1952	1500	3000	1320	1320	1620
1953	2000	4000	1760	1760	2160
1954	2000	4000	1760	1760	2160
1955	2000	4000	1760	1760	2160
1956	2000	4000	1760	1760	2160
1957	2000	4000	1760	1760	2160
1958	2000	4000	1760	1760	2160
1959	3000	6000	2640	2640	3240
1960	3000	6000	2640	2640	3240
1961	3000	6000	2640	2640	3240
1962	3000	6000	2640	2640	3240
1963	3000	6000	2640	2640	3240
1964	3000	6000	2640	2640	3240
1965	3000	6000	2640	2640	3240
1966	3000	6000	2640	2640	3240
1967	3000	6000	2640	2640	3240
1968	3000	6000	2640	1640	3240
1969	3000	6000	2640	2640	3240
1970	3000	6000	2640	2640	3240
1971	500	1000	440	440	540
1972	400	800	c52	352	432
1973	500	1000	440	440	540
1974	400	800	352	352	432
1975	300	600	3ee	264	324
1976	100	200	88	88	108
1977	150	300	132	132	162
Average	1994 (2000)	3988 (400)	1751	1751	2076

Table 2. *Action-raFdius of rooks (km) and its distribution (ind/p. c.) in the feeding areas between 1952—1977*

Feeding area	March radius of action	March ind.	March p. c.	April radius of action	April ind.	April p. c.	May radius of action	May ind.	May p. c.
Grassland	15	2400	60	é5	400	10	7	200	5
Lucerne	10	800	20	5	400	10	5	400	10
Corn-sowing				8	1000	50	6	800	20
Maize-sowing				6	400	10	4	1200	30
Rice-plantation				5	400	10	4	200	5
Plough-land	10	800	20	6	400	10	3	200	5
Orchard							2	200	5
Flood-plain							2	800	20

Table 3. *Distribution in space and time of the rooks collected for feeding investigation (1952—1977)*

Collecting station	March ad.	April ad.	May ad,	juv.	Total
Grassland	20	10	10		40
Lucerne	10	10	20		40
Corn-sowing		20	5		25
Maize-sowing		10	5		15
Rice-plantation		10	6		15
Plough-land	20	10	5		35
Orchard			10		10
Flood-plain			10		10
Nesting colony			10	50	60
Altogether	50	70	80	50	250

Table 4. *Mean values of the daily food requirements od a rook colony in the Sasér area in the months March-April-May (1952—1977)*

Kind of food	Adult rooks in March		Adult rooks in April		Adult rooks in May		Juvenile rooks		Total food in May	
	kg	p. c.	kg	p. c.	kg	p. c.	kg	p. c.	kg	p. c.
Vegetable matters	196	70	170	66	96	40	60	30	156	36
Invertebrates	56	20	64	24	72	30	80	40	152	35
Vertebrates	28	10	26	10	72	30	60	30	132	29
Altogether	280	100	260	100	240	100	200	100	440	100

Table 5. *Food requirement of a rook colony in the Sasér area, monthly and summarized in the period of reproduction*

Kind of food	Adult rooks in March		Adult rooks in April		Adult rooks in May		Juvenile rooks in May		There-monthly total food amount	
	kg	p. c.	kg	p. c.	kg	p. c.	kg	p. c.	kg	p. c.
Vegetable matters	6076	70	5070	60	2976	40	1860	30	15 982	53
Invertebrates	1736	20	1950	24	2232	30	2480	40	8398	28
Vertebrates	868	10	780	10	2232	30	1860	30	5740	19
Altogether	8680	100	7800	100	7740	100	6200	100	30 120	—