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GRANIVOROUS BIRDS IN ECOSYSTEMS

Granivorous birds are considered to be species which feed on seeds, droplets and fruits of plants in general. Not enclosed in such a definition, however, is feeding on (or the transportation of) pollen, although pollen of a number of plant species is able to germinate or produce seedlings. Our knowledge about this specific relationship of birds and plants and about their respective impact on ecosystems, however, is like the jaw of a rodent – there are more gaps than teeth.

The present and rather short paper deals only with European birds (391 species) and ecosystems. Therefore, the conclusions made do not exclude other generalizations.

Ecosystems considered:

- Water bodies in general, marsh and bog.
- Grassland in general: Steppe, meadow, pasture, waste areas.
- Shrubs, fencerows, windbreaks, vineyards, plantations.
- Fields.
- Urban areas: Gardens, orchards, backyards.
- Forests.

The respective ecotones should be added or subtracted.

BIRDS INVOLVED

Of all European bird species, 114 (or 29%) are obligatory or facultatively granivorous and are associated with the following ecosystems: Water bodies – 16 species, urban habitats – 26, grassland – 27, fields – 31, shrubs – 37, and forests – 53. Aquatic ecosystems hold significantly fewer and forests significantly more granivorous species, while all other ecosystems show species numbers according to expectation (chi square test).

Taxonomically, 63% of the granivorous bird species belong to the Passeres. 66% of all species considered are also rather small, i.e. weighting less than 100 gr., which corresponds to an active body surface of less than 215 cm². This, in turn, correlates with the gross metabolism, i.e. with the energetic requirements per time unit. Seeds in general (here meant as diaspores of plants) represent a concentrated food of relatively high calorific value. Therefore, granivorous birds benefit with regard to their requirements because they can collect and digest food of a calorific value mostly above 4000, even above 6000 kcal (dry). The optimal foraging of seeds is determined mostly by

energetics, which depends, e.g., on the bird's metabolism, the energetic content of the seeds consumed, the distribution of seeds in space (in terms of area as well as number of consumable seeds per plant), the distance covered by a bird to find the food, the selection of food for adults and offspring, respectively, the number of seeds that can be collected at a time (then either digested or carried to a nest, cache, storage or feeding place), and the stress during foraging or/and transport of seeds.

Other advantages are seasonal differences in feeding on seeds and the possibility to use seeds as an alternative to any other plant material or animal food, which consequently means a shift between two or more levels in the food chain. Here we border the more general and complex problem of diversivory or polyphagy in birds (and other animals), mostly from the point of view of biological production. Most seed eating birds shift their feeding habits – both in time and space – from primary to secondary consumption. Even so called specialists, such as nutcrackers, crossbills, and goldfinches, indeed feed both on seeds (of different kinds, as in the case of crossbills which can consume spruce seeds, weeds, oat, and sunflowers) and animal food, such as caterpillars, beetles, aphids, even when other forms of food are plentiful. On the level of biological production we have, unfortunately enough, not solved the questions concerned with diversivory. This is a matter of secondary production, energy flow, ecological niche of birds, and their abilities for adaptation (at least trophically). Certainly, the problem of “mixed eating” deserves more attention in ecological research.

IMPACT ON ECOSYSTEM

The impact of granivorous birds on any ecosystem can be viewed from different points: Economical, biocenological, and energetics of production.

It is not surprising that the best known impact of granivorous birds is an economical one. There are many studies and publications on the damage done by “pest birds”, e.g. by starlings in vineyards, olive plantations, or maize fields, by pigeons and sparrows on cereal, by bullfinches on buds of trees and shrubs, by American blackbirds in different cultivated plants, and finally the damage (real or supposed) caused by some crows in fields or by some parrots in gardens in India and recently in the USA. But economics should also be considered when talking about the influence of granivores on the quality, quantity, and distribution pattern of weeds (and some other plants), selective feeding on specific weed seeds, the massive consuming of weeds or “pest insect” by large bird flocks. About such and many other aspects of economy our knowledge are modest at best, for we have herbicides and insecticides. We also “do not want birds” because we need more and more of primary and secondary production – for a miserable world distribution of goods produced. To sum up: Granivorous birds in fact cause some – locally or regionally restricted – damage to cultivated plants and, therefore, to primary production. But that damage is negligible in comparison to land deteriora-

tion, willingly or unwillingly bad distribution of products, and the hardly correctable pollution of our environment.

We will now return to ecological and biocoenological aspects. In some – if not in most – ecosystems granivorous birds are temporarily or permanently the dominant group of consumers, and their importance and role in an ecosystem can be described as follows: They consume large amounts of plant material, including seeds, of which some are transported and distributed while others – either autochoric or anemochoric in dispersal – are restricted in their propagation. Of course granivorous birds also produce (secondarily) biomass by themselves and, therefore, they contribute in the food chain to secondary and tertiary consumers, mostly as food, or “key industry”, for birds of prey, the fate of which is sadly dubious. Besides conversion of plant material into animal tissue, granivorous birds of course exchange matter between ecosystems. Also the impact of granivores on the succession of ecosystems, especially on the level of plants, should be mentioned here. Finally, if we recognize that granivorous birds, especially the small sized species, will probably be the only free-living, surviving birds on cultivated land and in an environment dominated by man in the next centuries, then the importance of these birds is even more evident.

In biology we like to study and estimate optima. We speak and write about damages and vermin, without knowing what it really is and what could be optimum populations of pest species in our changing environment, without knowing the optimum diversity, species composition, density of most plants (including weeds), which trap the energy of sun, among other functions, and the optimum density of buds or fruits in a tree. Such a list could be continued.

I believe that the studies conducted in the last years within the Working Group on Granivorous Birds IBP will be of paramount importance towards solving most of the problems and questions sketched here, and, furthermore, will contribute to both the International Biological Programme and to Man and Biosphere. But, as to studies and researchers: *Vivant sequentes!*

DICTIONARY

Diversivory: habit of feeding on a wide variety of food.

Biocoenological: investigating biological communities and the interaction among their members.