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Breeding biology and ecology of the Crested Lark (*Galerida cristata*) in highly modified agricultural landscape

Anthropogenic environmental changes are among the main causes of decline in the abundance and distribution of many bird species. However, some bird species demonstrate significant adaptability to changing conditions, altering their habitat preferences and inhabiting new, artificially created areas. An example of such a species is the Crested Lark (*Galerida cristata*), a bird of the Alaudidae family that originally inhabited open steppe and semi-desert areas, but has expanded to colonize a wide range of habitats created by human activity. One types of habitat are open roadside areas, created due to construction of motorways and expressways. Despite the growing importance of these environments, knowledge about the functioning of Crested Lark populations in these habitats remains limited, justifying the need for detailed research.

The aim of this doctoral dissertation was to characterize the breeding biology and ecology of the nominate subspecies of the Crested Lark (*Galerida cristata cristata*) in roadside habitats. Fieldwork was conducted between 2018 and 2022 along the Inowrocław bypass road (central Poland), which runs through the agricultural landscape of the Kuyavia region. The study analysed nest location, detailed reproductive parameters (e.g. egg dimensions, clutch and brood size, hatching and breeding success, and number of fledglings), as well as lesser-known aspects of the species' biology such as brood survival and factors affecting nest survival. Additionally, nestling growth patterns and variables influencing their development rate were examined.

The results showed that Crested Lark in studied population most often built nests in grassy roadsides, close to the road edge. Nest entrances orientation showed a clear north-east bias. In central Poland, the breeding season lasted from the third decade of March to the second

decade of August. Breeding success in the studied population was 43.1%. It was also found that the nest survival rate in the egg stage was twice as high as in the nestling stage. Time of breeding, air temperature, and the distance from the road were the main factors that affected nest survival. Clutches initiated later in the season and located farther from the road edge had a significantly greater chance of success.

The growth pattern showed that, like other larks, that Crested Lark nestlings were characterized by a rapid growth rate. By day 9, their body weight had increased tenfold, and they had almost reached their final tarsus length. Sex had no significant effect on most of the analysed growth parameters. However, nestlings growth rate was significantly affected by brood size – larger clutches were associated with greater intra-brood competition, which could have influenced individual development.

In summary, roadside habitats created by the construction of expressways, may constitute an important breeding habitat for Crested Larks in heavily transformed agricultural landscapes. These results expand our knowledge of the breeding biology of this species and may have practical applications in monitoring of productivity and population size, conducting large-scale comparative studies, and planning conservation measures for this species, particularly in the context of anthropogenic habitats.