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The introduction and naturalisation of birds

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Distribution and expansion of the common waxbill *Estrilda astrild* in Portugal

Luís Miguel Reino & Tiago Silva

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The common waxbill *Estrilda astrild*, a native of Africa has been introduced to many countries. In Europe it was first introduced in Portugal in 1964. It has since spread to much of the country, probably helped by several releases and now breeds also in Spain, Extremadura, Andalucía, and Galicia. The occurrence of the common waxbill in Portugal was mapped over five five-year periods, starting in 1974. At least two release areas can now be identified. The species expanded initially along large river valleys and the coastline, then spread inland along river valleys. The common waxbill is now common all over southern Portugal, and more localised in the north. It is believed that the common waxbill expansion in Portugal is due to the existence of breeding habitats similar to those in Africa. Breeding biology has played a part in the expansion with the species able to raise several broods almost throughout the year. The rate of expansion has decreased since 1984, although the distribution has not yet stabilised.

L.M. Reino, Av. Dr. Mário Moutinho, L-1733, 10 E, 1400 Lisbon, Portugal
T. Silva, Rua António Ferreira, 11, 2 E, 1700 Lisbon, Portugal

Introduction

The common waxbill *Estrilda astrild* is a native resident of much of Africa, occurring in most areas south of 10° N (Cramp & Perrins 1994). It has also become naturalised in many other areas including Brazil, California and Oahu (Hawaii) in USA, Tahiti, Puerto Rico, Ascension, St. Helena, Mauritius, Réunion, Rodriguez, Seychelles, Amirantes, New Caledonia, Bermuda, São Tomé, Príncipe and the Cape Verde Islands. It was also introduced to the Azores, Madagascar and Comoros, but apparently became extinct on those islands after some time (Long 1981; Goodwin 1982; Smallwood & Salmon 1992; Clement, Harris & Davis 1993; Cramp & Perrins 1994).

In Europe the common waxbill was first recorded in Portugal in 1964 (Xavier 1968). It was confirmed later that this was due to an introduction in that same year (Vicente, pers. comm.). Since then, it has spread over a large part of the country, probably assisted by several releases. It now breeds in Spain's Extremadura, Andalucía (Guerrero, de Lope & de la Cruz 1989) and Galicia regions, where it has been recorded at least since 1989 (Costas, pers. comm.). In Portugal, the species was initially identified as red-eared waxbill *Estrilda troglodytes* although this initial identification is now believed to be incorrect (Vicente, pers. comm.). The common waxbill is now common all over southern Portugal, and more localised in the north.

Methods

Published data on the occurrence of the common waxbill in Portugal was collected in order to map its distribution at five-year intervals, beginning in 1974 and running to 1994. The same 20 km x 32 km grid as used in the Portuguese national breeding atlas (Rufino 1989) was used. The grid is based on 1/50 000 scale maps, produced by the Portuguese Instituto Geográfico e Cadastral.

The mapped information referring to 1979 and 1984 was drawn largely from the Portuguese breeding atlas. Records concerning the Baixo Alentejo (southern Portugal) for the early 1990s were made during fieldwork for the wintering atlas of Baixo Alentejo, organised by the sociedade Portuguesa para o Estudo das Aves. Records obtained mainly in the Minho (north-west Portugal) and Alentejo areas from 1988 to 1994, were collected by the authors.

Results

The five distribution maps (Figure 1) show the range changes of the common waxbill in Portugal over the last twenty years, at five year intervals.

It was introduced initially in western Portugal (Figure 1A), spreading along the Tagus valley and then along the Sado and Mondego valleys. The 1979 map (Figure 1B) shows two isolated records in the Algarve (southern Portugal), dating from 1977, possibly as a result of a local introduction (Ferreira 1984). The possibility of two distinct introductions

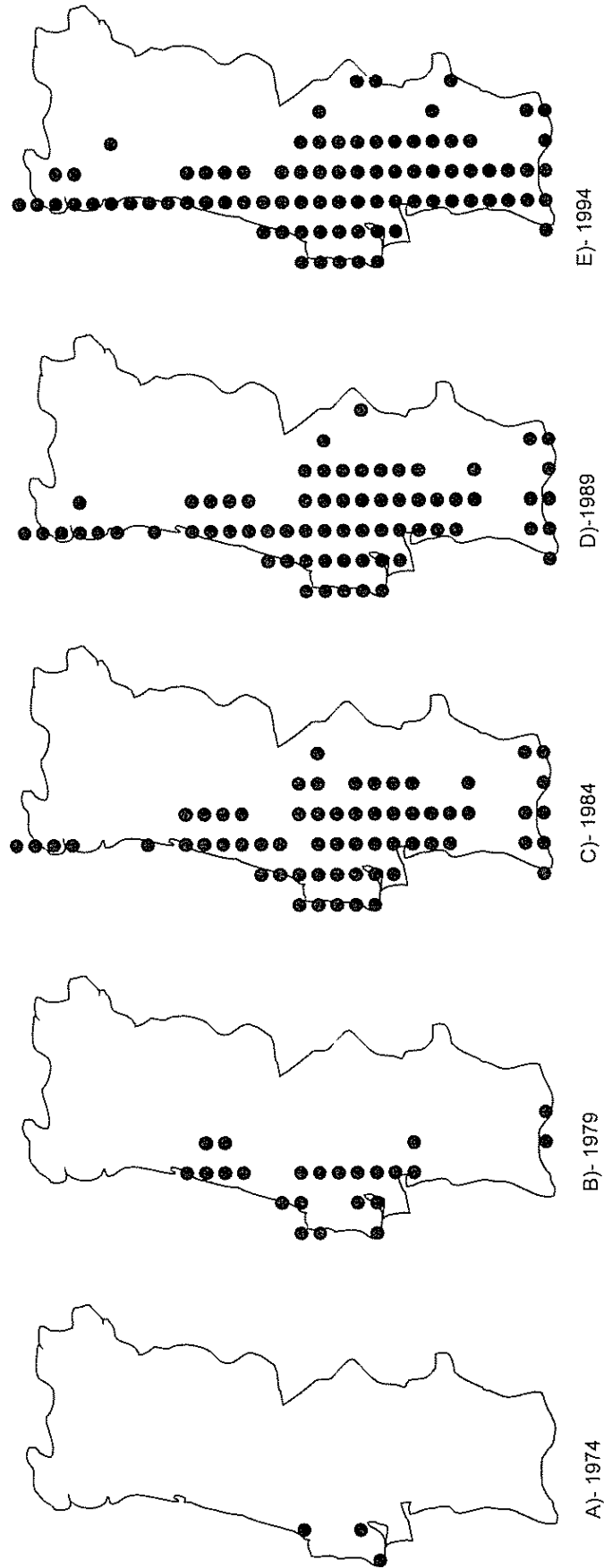


Figure 1. Range changes of the common waxbill in Portugal, 1974-1994.

is also suggested by Teixeira (1981), based on the lack of records between the Sado and the Algarve.

After 1980, the common waxbill expanded into many other parts of Portugal achieving a complete colonisation of the Tagus and Sado valleys. In the Algarve, there was also a marked expansion, despite a lack of continuity of recording in the Baixo Alentejo (cf. Teixeira 1981; Ferreira 1980-81, 1984; Rufino 1989). In the central part of the country, the species attained a more or less continuous distribution along the coast, and became locally distributed further north (Figure 1C).

In the second half of the 1980s, the species was observed for the first time in the Guadiana valley (Guerrero, de Lope & de la Cruz 1989) and had become almost continuously distributed along the coast of northern Portugal (Figure 1D).

Finally, during the early 1990s there has been a marked spread into Alentejo, with further records in the Guadiana valley and the south-west coast, where its distribution is now almost continuous. In northern Portugal the coast is already fully colonised and records have also begun to occur inland (Campinho, Lourenço & Rodrigues 1991; Pinto 1993) (Figure 1E). Recent information indicates that the species has colonised the Lima and Homem river valleys, in the Peneda-Gerês mountain region (Pimenta & Pimenta, in litt.).

The common waxbill is now locally common along the entire coastline from the Minho river, in the north-west, to the eastern Algarve (Figure E). In the eastern half of Portugal it shows a less continuous distribution. It is common and widespread in the south, but scarce and local in the north, occurring

mainly along the Minho, Lima, Cávado, Ave and Douro valleys (cf. Rufino 1989; Campinho, Lourenço & Rodrigues 1991).

Plotting the square root of the occupied area against time (Figure 2) shows that the rate of expansion has decreased since 1984, although this expansion has not yet ceased.

Discussion

The common waxbill is one of the most popular cage birds in Portugal partly because it is a common bird in the former Portuguese colonies of São Tomé, Angola and Mozambique in Africa. In 1975, about half a million Portuguese settlers returned during the independence process, some bringing waxbills with them as a reminder of the colonies. There is currently no legislation in Portugal regarding the release of captive exotic animals.

It is believed that the common waxbill's successful expansion in Portugal is due to the existence of habitats which are similar to those in its countries of origin (e.g. climate, vegetation, food supplies and breeding sites).

The species is presently apparently excluded from the supramediterranean (in the Mediterranean region) and montane, subalpine and alpine (in the Eurosiberian region) bioclimatic stages, as defined by Rivas-Martinez (1987). The fact that it has not occupied the inland mountain and plateau regions north of the Tagus river, indicates a preference for the Atlantic-type climate.

In its native range, the species inhabits open country with long grass, marshes, reeds or long grass near water, cultivated areas (provided there are seeding grasses and cover of long grass, reeds or bushes), forest clearings, gardens and other areas near human habitations (Goodwin 1982). In Portugal, it was initially confined to reedbeds and hedges, but now also occupies riverine vegetation and agricultural fields (Rufino 1989). During the winter and in the Baixo Alentejo region, the most used biotopes are, in decreasing order of number of records: riverine vegetation, reedbeds, rice stubble and various types of hedge.

The species feeds mainly on grass seeds, taken mainly from flower heads (Cramp & Perrins 1994). In the Amazon, it feeds mainly on seeds of the grasses *Panicum maximum*, *P. purpureum*, *Digitaria horizontalis*, *Sporobolus indicus* and *Echinochloa* spp., a sedge *Cyperus surinamensis* and the amaranth

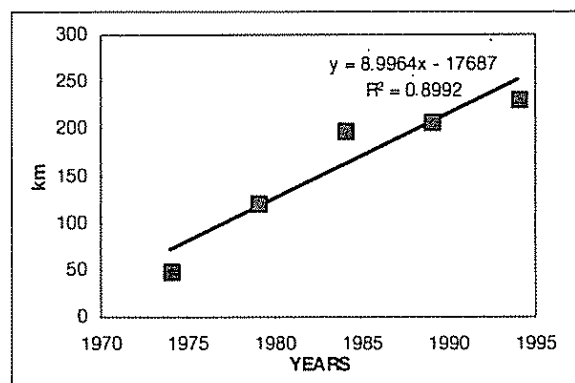


Figure 2. Square root of the area occupied by the common waxbill in the five periods.

Amaranthus spinosus (Oren & Smith 1981). In Portugal, the common waxbill feeds often on grasses *Echinochloa crus-galii* and *Phalaris* spp., *Phragmites* reeds and bean plants (Heinzel & Wolters 1970; Höller & Teixeira 1983; Ferreira 1991). Although there are similarities in the food resources between different populations (e.g. the *Echinochloa* grass and the reed seeds), the species seems versatile enough to explore new resources such as bean crops.

Breeding biology has also played a part in the species expansion: the common waxbill breeds almost throughout the year and can raise several broods of five to seven chicks. Breeding has been recorded between February and November in Portugal, though the peak is between April and July (Rufino 1989; Ferreira 1982). The common waxbill breeds mainly in reedbeds, stands of *Arundo donax*, riverine vegetation with dense bushy cover, and hedges in agricultural land (especially if they are well developed and close to water), although the species' versatility is demonstrated by records of breeding in ruins, fruit trees and stone pine *Pinus pinea*.

The common waxbill's expansion in Portugal has not yet stabilised, although its rate of diffusion has been decreasing since 1984. Precise factors limiting this species' expansion in Iberia are unknown as are potential impacts on native species, although none have so far been reported.

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