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Semicolonial nesting and conservation of the Montagu's harrier *Circus pygargus* in rapeseed fields in Southern Podlasie (eastern Poland)

Semikoloniálne hniezdenie a ochrana kane popolavej *Circus pygargus* v repkových poliach v južnom Polesí (východné Poľsko)

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Abstract: Agrocoenosis are important nest sites for Montagu's harriers. In 2009, a large semicolony of 14 Montagu's harrier pairs was recorded in a rapeseed field in eastern Poland. The breeding colony arose due to a shortage of crops of suitable height in the period of nest building, caused by unfavourable weather conditions and a delayed onset of vegetation growth. The mean clutch size and hatchling number was 3.62, and the mean number of chicks in pairs that bred successfully was 2.00. Losses in broods due to predation and farming treatments were low (2% and 6%, respectively).

Abstrakt: Agrocenózy sú dôležitým miestom hniezdenia kaní popolavých. V roku 2009 bola zistená hniezdiaca kolónia 14 párov kaní popolavých v repkovom poli na východe Poľska. Hniezdna kolónia vznikla z dôvodu nedostatku obilia vhodnej výšky v čase stavby hniezd zapríčinenej nevhodnými klimatickými podmienkami a oneskoreným začiatkom vegetačného rastu. Priemerná veľkosť znášky a vyliahnutých mláďat bola 3,62, priemerný počet úspešne vyletených mláďat na hniezdiaci pár bol 2,0. Straty na hniezdení spôsobené predáciou a poľnohospodárskymi činnosťami boli nízke (2 % a 6 %).

Key words: active conservation, semicolony, arable fields, agrocoenosis

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Introduction

The Montagu's harrier is a scarce lowland bird species. It inhabits mainly the eastern part of Poland, especially Podlasie, Mazovia and the Lublin area (Tomiałojć & Stawarczyk 2003). Data available from the 2007–2008 Monitoring Birds of Prey Programme provided a national population estimate of 3,300–3,550 breeding pairs (Cenian 2009). In Southern Podlasie this species is widespread and an intensive search of territories in 2007–2009 revealed 240–270 pairs in the Biała Podlaska, Łosice, Siedlce and Sokołów districts (personal data). The Montagu's harrier often nests in semicolonies (Arroyo et al. 2004). The largest semicolonies in Poland were found near Trzebnica (Silesia) by Lontkowski (1993) (6 breeding pairs) and in the Upper Narew River Valley (10 pairs) (Pugacewicz, pers. comm.). In addition, Menderski (unpubl. data) observed in 2007 a grouping of 8–9 pairs in a triticale field near Syberia (Mława District, northern Poland). Larger semicolonies, of about 15 pairs, were recorded in west Belarus (Vintchevski & Yasievitch 1998), and of up to 30 pairs in Central Spain (Arroyo et al. 2002).

Observations and discussion

In 2009, during the Montagu's harrier Conservation Programme led by the Wildlife Society "Stork" (Krupiński 2009), a 14-breeding pair colony was discovered near Komarno (N 52,2 E 23,1, Biała Podlaska District, eastern Poland) (Fig. 1). Also, within 1.7 km from the colony and in the same crop, the nests of two additional pairs were found. The search and safeguarding of nests was performed in the last ten days of June. All localized nests (n = 13) were marked with poles and their position was determined with a GPS device. In order to protect the nests from predation and farming treatments (desiccation date: June 25–28, mowing date: July 14–16) a square 3.0×3.0 m of fence (hexagonal wire mesh) was constructed around the nests (Krupiński 2009).

All the pairs nested in rapeseed, eleven of them in a 28.5 ha field, which corresponds to density of 3.85 pairs / 10 ha. The nearest neighbour nest distance (NNND) determined for the 13 nests was 123 m (median = 81 m; range 59–485 m). The nests were observed at various breeding stages, from an incubated clutch with four eggs to two 13-day chicks (age was determined by the size and development of feathers according to Aureau et al. 2008). The first eggs in the colony were laid around May 10 and the first chicks hatched around June 10. The greatest difference between onsets of breeding was at least two weeks. The mean clutch size and number of hatched chicks was equal 3.62 (SD = 0.92; range 1–5; Table 1). The number of fledgings per pair was 2 (total = 26; Table 1) and no divergence from 1:1 sex ratio was seen (according to Lontkowski & Skakuj 1994). Only partial losses due to hunger or cainism were observed, reaching 36% (n = 17) at the nestling stage. In addition, three poorly flying chicks that were outside their nest were killed during mowing (6%) and one chick was killed by a northern goshawk (*Accipiter gentilis*) (2%). Overall, losses in the colony reached 45%.

Semicolonial nesting of Montagu's harriers evolved as a result of benefits obtained from the close neighbourhood of pairs of the same species. Single pairs or birds from smaller groups are less effective in brood defence against attacks of predators, especially corvids Corvidae and terrestrial mammals (Kitowski 2003, 2008, Wiącek 2008). Studies conducted at peatbogs (Kitowski 2008) showed that the optimal colony size is 4–5 pairs. Larger colonies more often attracted predators, which plundered all neighbouring nests (Kitowski 2008). Field semicolonies typically have larger neighbouring nest distances (Arroyo 1995). In our colony, the NNND was comparable with the NNND of single pairs nesting in peatbogs (Kitowski 2008, Wiącek 2008) but losses during each period of breeding season were lower. Harriers in peat bogs completed their breeding successfully on average in 42.9% of breeding attempts (Kitowski 2008) breeding success in the described colony was higher at 55% (Table 1) compared to colony in peat bogs (Kitowski 2008). On the other hand, the lower offspring production per pair in our colony compared to Kitowski (2008) and (Krupiński 2009) was probably

Tab. 1. Clutch size and breeding success of Montagu's harriers (*Circus pygargus*) nesting in rapeseed
Tab. 1. Veľkosť znášky a úspešnosť hniezdenia kaní popolavých (*Circus pygargus*) hniezdiacich v repkovom poli

nest no. / č. hniezda	mean distance to neighbouring nest / priemerná vzdialenosť k susednému hniezdu [m]	clutch size / veľkosť znášky	number of fledged chicks / počet vyletených mláďat	number of chicks able to fly / počet letuschopných mláďat
1	485	4	3	2
2	100	4	3	3
3	108	4	3	2
4	200	4	1	1
5	100	3	2	2
6	59	3	2	2
7	81	4	2	2
8	80	3	3	3
9	72	2	2	1
10	72	5	3	3
11	105	4	2	2
12	80	2	2	1
13	59	5	2	2
Σ	**–**	**47**	**30**	**26**
offspring production in breeding stage / produkcia potomstva v hniezdnej perióde [%]	**–**	**100**	**64**	**55**
mean / priemer	**123**	**3.6**	**2.3**	**2**
median / medián	**81**	**4**	**2**	**2**
standard deviation / štandardná odchýlka	**–**	**0.9**	**0.6**	**0.6**

a result of low food abundance in 2009 (unpublished data). This is also supported by the relatively high losses due to starvation and cainism (n = 17).

Despite low predation in arable fields, a lower breeding success might be expected due to application of farming treatments (Arroyo et al. 2002). In our colony, losses resulting from harvest were three times higher than those resulting from predation. However, Arroyo et al. (2002) estimated that looses by harvesting can reach even 60% of offspring production in unprotected colonies.

We suspect that, especially in the years with delayed winter crop growth during nest building, large colonies can be formed in meadows, lucerne or rapeseed, which may lead to large production losses connected with earlier date of agricultural operations in that crop type (compared to cereals). Breeding losses in rapeseed are associated with the dates of two farming treatments, (1) spraying with a desiccant and (2) mowing, which are earlier than the fledging date. Desiccation may coincide with the late incubation stage, when embryos and nestlings are extremely vulnerable to hypothermia (Krupiński unpubl.). Spraying activities flush females and this may lead to the death of embryos and nestlings in unfavourable weather conditions, caused by hypothermia and brood abandoning. A similar situation was described in the colony of 7 pairs located in the Działdowo District (north Poland; S. Menderski, personal information). The second factor causing losses is the mowing date. When the mowing occurs earlier than the fledging date, then poorly flying chicks or chicks incapable of flight are in high risk (n = 3). In 2009, the proportion of nests built in rapeseed reached 23.9% and was considerably higher than average from the years 2005–2009 (14.4%; Krupiński unpubl.). Also, more nests were observed in meadows: 10.2% in 2009 and 8.0% in 2005–2009 (Krupiński 2009), where breeding success was low because of earlier harvesting.

The vegetation height at the time of nest site selection is more important than the vegetation type, and

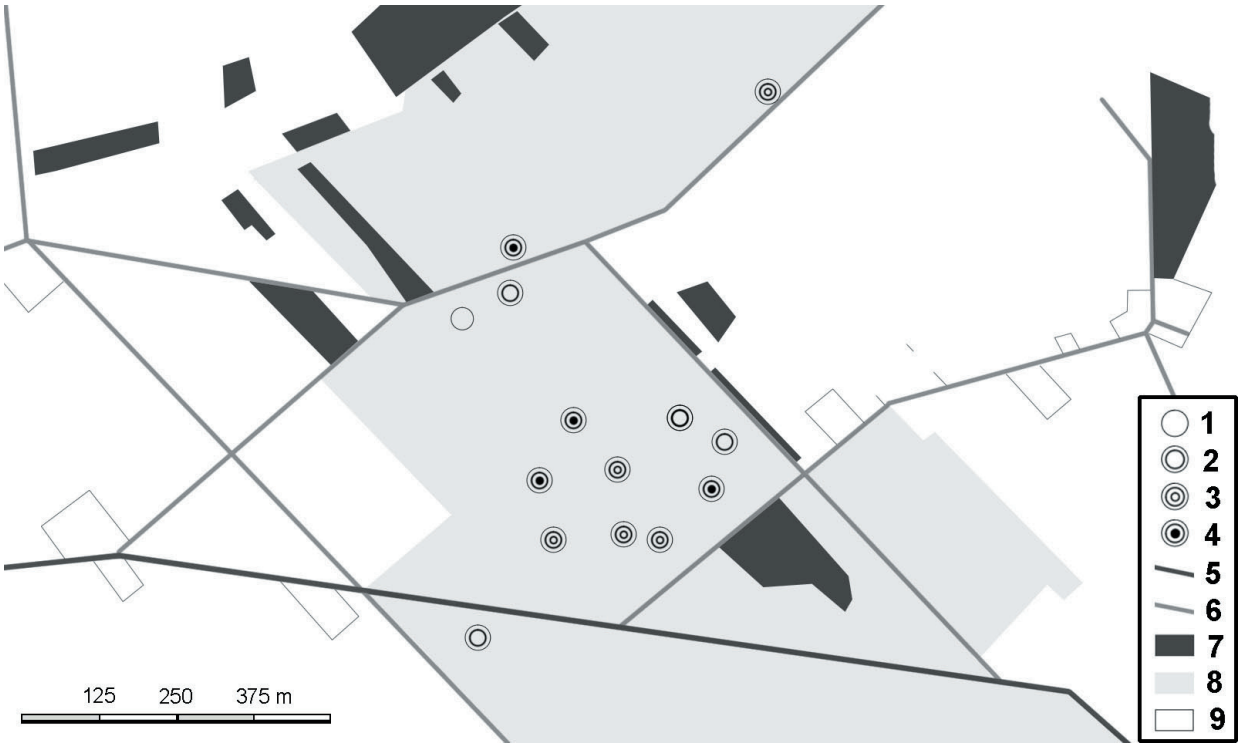

Fig. 1. Locations of Montagu's harrier (*Circus pygargus*) nests in the protected breeding colony. 1 – nest without any nestlings, 2 – nest with 1 nestling, 3 – nest with 2 nestlings, 4 – nest with 3 nestlings, 5 – road, 6 – sand road, 7 – wood, 8 – rape field, 9 – built-up area.

Obr. 1. Umiestnenie hniezd kaní popolavých (*Circus pygargus*) v chránenej hniezdnej kolónii. 1 – hniezdo bez mláďat, 2 – hniezdo s 1 mláďaťom, 3 – hniezdo s 2 mláďatami, 4 – hniezdo s 3 mláďatami, 5 – cesta, 6 – piesková cesta, 7 – les, 8 – repkové pole, 9 – zastavaná plocha.

therefore it is impossible to discuss selectivity towards a specific crop type. A hypothesis based on studies in farmland areas in Spain, was formulated by Claro (after Arroyo et al. 2002), and as a key factor, apart from habitat food abundance and reproductive success in the preceding year, crop height was also mentioned by Arroyo et al. (2002).

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