

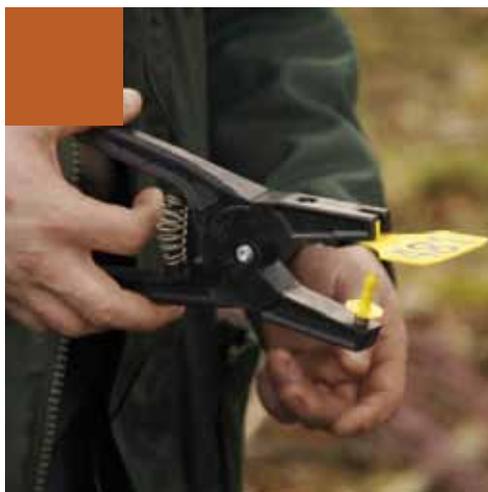
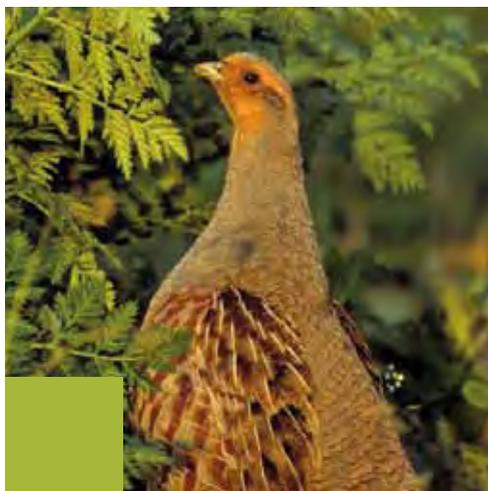
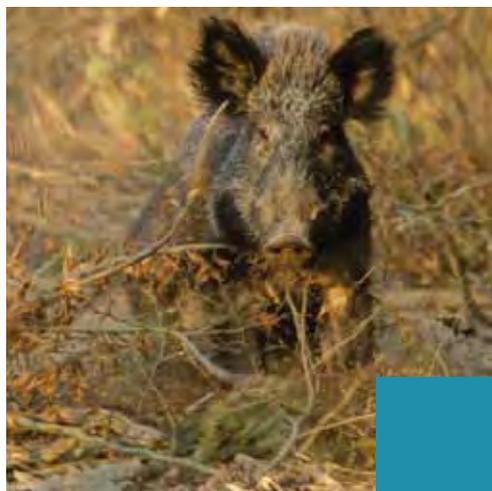
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Habitat improvement actions and pheasant and red-legged partridge land uses

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KEYWORDS : *Alectoris rufa* ; feeders ; hedgerows ; *Phasianus colchicus*

Introduction

Red-legged partridge (*Alectoris rufa*) and Pheasant (*Phasianus colchicus*) have suffered population declines in the last decades. Several researches have suggested that the decline is related to the habitat alterations in agricultural ecosystems caused by intensification of agricultural techniques and land abandonment. For this reason We evaluated habitat use and distribution of red-legged partridges pairs and cock pheasants in an estate that can be representative of most of the agricultural Mediterranean areas.

Material and methods

The study area was located in South-western Tuscany (Italy). Birds habitat use was observed from 2007 to 2012 with particular attention to the effect of artificial Habitat Improvement Actions (HIAs) and other management options such as supplemental feeding and hedgerows maintenance. Relative habitat use and spatial distribution (comparing points with birds and random ones) were calculated for pheasant cocks and partridge pairs.

Results

HIAs were used more then their availability by both species and resulted to have an important role in their distribution as well as hedgerows. Feeders resulted to have a strong effect on pheasant distribution, but not on partridges pairs. Partridge pairs significantly avoided woods and fallow fields but were significantly closer to hedgerows, HIAs, and fallow fields then random points. Pheasant cocks were significantly closer to HIAs, hedgerows, feeders, fallow fields, and woodland edges then random points. Logistic regression analysis between partridge pairs observation and random points showed a negative effect of distances from HIAs, hedgerows, vineyards, and fallow fields and a positive effect of distances from woods, arable crops, and olive tree groves whereas for pheasants we registered a negative effect of distances from HIAs, hedgerows, feeders, woods, and fallow fields and a positive effect of distances from arable crops.

Discussion and Conclusions

Our results confirmed that habitat management could be a fundamental tool for game-birds conservation and give important comparative evaluation of the different land uses. However the effectiveness of the employment of artificial feeders need to be better clarified for red-legged partridges.

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Habitat improvement actions and pheasant and red-legged partridge land uses

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Introduction

Red-legged partridge (*Alectoris rufa*) and Pheasant (*Phasianus colchicus*) have suffered population declines in the last decades. Research has suggested that the decline is mainly related to the intensification of agricultural techniques and land abandonment. For this reason We evaluated habitat use and distribution of reared red-legged partridges pairs and cock pheasants released in an estate that can be representative of most of the agricultural Mediterranean areas with particular attention to the effect of artificial Habitat Improvement Actions (HIAs) and other management options as supplemental feeding and hedgerows maintenance.

Material and methods

The study area was located in South-western Tuscany (Italy). Birds habitat use was observed from 2007 to 2012 with particular attention to the effect of artificial Habitat Improvement Actions (HIAs) and other management options such as supplemental feeding and hedgerows maintenance. Relative habitat use and spatial distribution (comparing points with birds and random ones) were calculated for pheasant cocks and partridge pairs.

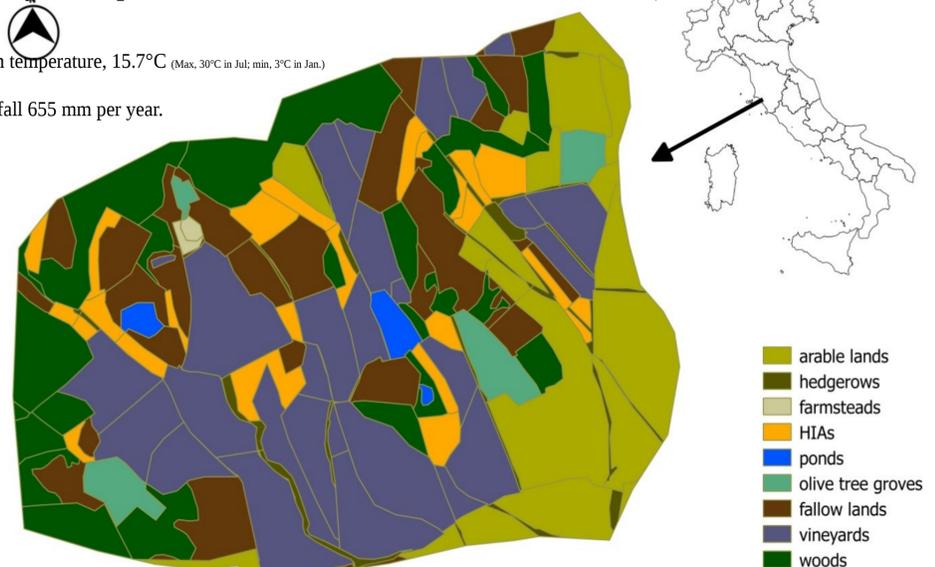
Results

Presences in the habitat: HIAs were used more than their availability by both species and resulted to have an important role in their distribution. Partridge pairs used woods less than their availability.

Distances from habitat: Feeders resulted to have a strong effect on pheasant distribution, but not on partridges pairs. Pheasant cocks were significantly closer to HIAs, hedgerows, feeders, fallow fields, and woodland edges. Partridge pairs were significantly closer to hedgerows, HIAs, and fallow fields than random points. Logistic regression analysis between partridge pairs observation and random points confirmed the negative effect on distances from HIAs, hedgerows and fallow fields but showed also a significant negative effect on distances from vineyards and a positive effect on distances from woodlands, arable crops, and olive tree groves. Whereas for pheasants the negative effect on distances from HIAs, hedgerows, feeders, woodlands and fallow fields were confirmed but a significant positive effect was registered on the distance from arable crops.

Study area, province of Grosseto: 10° 59' E, 49° 55' N).

Mean temperature, 15.7°C (Max, 30°C in Jul; min, 3°C in Jan.)
Rainfall 655 mm per year.



0 100 200 300 400 500

Pheasant bag records in the 19 hunt
Tuscany (Italy) from 1997 to 2010.

Habitat use by red-legged pairs (pooled years: 2007-2012) n = 124	Availability Km ²	Expected usage proportions %	Observed usage proportions %
Arable crops	0.5111	19	22
HIAs	0.2421	9	23**
Olive tree groves	0.0807	3	5
Fallow fields	0.5649	20	14*
Vineyards	0.8608	32	36
Woods	0.4304	17	0**
Total	2.6900	100	100

Average distance (±SE) of partridges pairs between random points and habitat variables	mean distances		Mann-Whitney U test		
	n	couples	random points	U	P
HIAs	124	148 ±12.7	181 ±12.9	6531	<0.05
Hedgerows	124	40 ±3.1	64 ±4.9	5246	<0.0001
Feeders	124	188 ±12.1	212 ±12.5	6802	n.s.
Vineyards	124	64 ±9.3	78 ±11.8	7248	n.s.
Arable crops	124	244 ±21.3	200 ±21.1	6763	n.s.
Fallow fields	124	97 ±11.4	127 ±11.0	6544	<0.05
Olive tree groves	124	303 ±14.8	287 ±14.5	7153	n.s.
Woodland edges	124	268 ±21.2	225 ±22.8	6698	n.s.

Logistic Regression Analysis between points with partridges pairs and random ones	Estimated b	SE	P
Distance from HIAs	-0.004	0.0012	< 0.001
Distance from hedgerows	-0.017	0.0038	< 0.0001
Distance from feeders	-0.001	0.0011	n.s.
Distance from woodlands	+0.001	0.0007	< 0.05
Distance from vineyards	-0.003	0.0014	< 0.05
Distance from arable crops	+0.002	0.0008	< 0.01
Distance from olive tree groves	+0.002	0.0010	< 0.05
Distance from fallow fields	-0.004	0.0013	< 0.01
Constant	0.935	0.4160	< 0.05

Loglikelihood=146.7; R_{adj}²=0.15; Model Chi-square P <0.0001

Habitat use by pheasant cocks (pooled years: 2007-2012) n = 94	Availability Km ²	Expected usage proportions %	Observed usage proportions %
Arable crops	0.5111	19	17
HIAs	0.2421	9	28**
Olive tree groves	0.0807	3	3
Fallow fields	0.5649	21	14
Vineyards	0.8608	32	28
Woods	0.4304	16	11
Total	2.6900	100	100

Average distance (±SE) of pheasant cocks between random points and habitat variables	mean distances		Mann-Whitney U test		
	n	cocks	random points	U	P
HIAs	94	133 ±16.0	182 ±14.7	3293	< 0.01
Hedgerows	94	50 ±4.2	75 ±6.7	3290	< 0.01
Feeders	94	159 ±13.1	221 ±15.4	3230	< 0.01
Vineyards	94	69 ±13.2	83 ±14.2	4212	n.s.
Arable crops	94	221 ±25.3	212 ±24.6	4155	n.s.
Fallow fields	94	91 ±10.5	137 ±14.3	3623	<0.05
Olive tree groves	94	303 ±18.1	291 ±17.3	4198	n.s.
Woodland edges	94	138 ±17.0	245 ±22.7	3210	< 0.01

Results of Logistic Regression Analysis between points with pheasant cocks and random ones	Estimated b	SE	P
Distance from HIAs	-0.003	0.0013	< 0.05
Distance from hedgerows	-0.009	0.0036	< 0.05
Distance from feeders	-0.004	0.0014	< 0.01
Distance from woodlands	-0.004	0.0011	< 0.001
Distance from vineyards	-0.000	0.0014	n.s.
Distance from arable crops	+0.003	0.0010	< 0.01
Distance from olive tree groves	+0.001	0.0010	n.s.
Distance from fallow fields	-0.004	0.0017	< 0.01
Constant	1.719	0.4838	< 0.001

Loglikelihood=106.0; R_{adj}²=0.19; Model Chi-square P <0.0001

Discussion and conclusions

Our results confirmed that habitat management could be a fundamental tool for game-birds conservation and give important comparative evaluation of the different land uses. However the effectiveness of the employment of artificial feeders need to be better clarified for red-legged partridges.

Keywords *Alectoris rufa*, *Phasianus colchicus*, feeders, hedgerows.