Nature-oriented management of set-aside land: do mammals benefit?

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Abstract

If managed well, set-aside land can contribute in nature-conservation in agricultural areas. This paper presents the results of a research into the effects of nature-oriented management of set-aside land in the Netherlands in 1993 - 1995.
In the case of small mammals, spontaneous regeneration of cereals and tillage in spring turned out to render higher numbers. In the case of larger mammals, set-aside field margins proved to be beneficial.
Since nature-oriented management can be beneficial for mammals (and other groups of fauna and flora), promotion of this management is pleaded.

1. Introduction

The importance of agricultural areas for the conservation of biodiversity is increasingly recognised in the Netherlands. It is understood that conservation measures in these areas are necessary, either to protect species which are highly dependent on them or in order the support measures in more natural habitats. In the Netherlands, the hamster *Cricetus cricetus* is highly dependent on agricultural areas (Krekels & Gubbels, 1996), where many other species are partly dependent on agricultural land (e.g. common hare *Lepus europaeus* and roe deer *Capreolus capreolus*). It is likely that many mammals, like other fauna and flora, have decreased considerably or disappeared in agricultural areas. Of the 25 species in the Red Data Book of Threatened Mammals in the Netherlands (Lina & Van Ommering, 1994), nine (mainly bats) are, to varying extents, dependent on agricultural areas.

In 1988 the European Union set-aside scheme meant a return to fallowing in Dutch arable areas. In 1992 this scheme was replaced by a renewed Common Agricultural Policy, which made set-aside semi-obligatory: under its terms, farmers wishing to qualify for income support now have to set aside part of their land. It quickly became clear that set-aside land can be quite beneficial to several fauna groups, including mammals, especially the common vole (Koks & Van ‘t Hoff, 1991). Set-aside has also proved to be beneficial to mammals in other European countries (see for example Parish, 1990; Wilson, 1990).

In the Netherlands, experience with nature-oriented set-aside was limited to large-scale non-rotational set-aside (in which fields are required to lie fallow for five consecutive years); under the new set-aside scheme, however, rotational set-aside became more common and was easier to incorporate into farm management. The Centre for Agriculture and Environment (CLM) therefore initiated research into the effects on flora, fauna and farm management of different nature-oriented management regimes in set-aside land. This project showed that these management regimes could be beneficial to all flora and fauna groups investigated and, under certain conditions, could successfully be incorporated into farm management (Buys et al., 1996; 1997). In this paper we present the effects of such management regimes on mammals.

2. Methods

The research was carried out between September 1993 and August 1995 on 22 arable farms spread over the provinces of Groningen, Zeeland and Limburg (fig. 1). 124 experiments were carried out, each in a plot whose management regime involved three variates:

- vegetation type;
- plot type;
- the time at which tillage takes place.

Table 1 gives an overview of the management regimes.

Due to practical circumstances, it was not possible to apply all the possible combinations in all regions. Furthermore, within the set of combinations that were actually applied, one particular combination was used more abundantly than others: the number of plots with leguminous species was higher due to the popularity of this vegetation type with the farmers involved.
Between them, all the experiments covered a total area of 141 ha; plot size varied between 0.10 and 10.0 ha. For a comprehensive description of the organisation of the experiment, see Buys *et al.* (1996).

Fig. 1. Location of the plots.

Table 1 Management regimes

Variable		Regime
Vegetation type	sg	**Spontaneous growth:** aims at the spontaneous development of a vegetation after tillage. The vegetation thus realised is a reflection of the seedbank in the soil.
	gc	**Grass/clover:** sowing a mixture of 90% grass and 10% clover, after a normal seedbed preparation.
	ce	**Regeneration of cereals:** aims to obtain an extensive vegetation by minimising costs and labour. The normal spilling of grains during harvest guarantees for sufficient seed for regeneration.
	aw	**Regeneration of cereals plus arable weeds:** similar to the regeneration of cereals, but extended by the sowing OF arable weeds specific to the region concerned. The chosen weeds are not noxious.
	ls	**Leguminous species:** the sowing of leguminous species aims at the creation of a varied vegetation that is rich in structure, and has a long flowering period.
Plot type	ef	Entire fields ($\geq$ 2 ha)
	fm	Field margins (10 - 20 m wide, < 1 ha)
Time of tillage	au	Autumn
	sp	Spring

2.1 Census methods

Two methods were used to perform a census of the mammals in the plots: one for three groups of small mammals (i.e., mice and rats, voles and shrews; in this paper referred to as 'small mammals'); and another for larger mammals.

We used live-traps of the Longworth type to estimate the numbers of species and individuals of small mammals. We installed a trap unit in a number of selected research plots. Each trap unit consisted of ten live-traps that were put in a line at five-metre intervals. For reference measurements we installed between one and three trap units in surrounding fields containing common crops such as sugar beet, cereals and potatoes. For a proper comparison, it was ensured that any site chosen in these crops was virtually identical to the research plots, i.e., with regard to their distances and positions from such non-productive landscape elements as woodland, hedges and ditches.

The limited amount of traps and time at our disposal compelled us to make a selection within the total number of plots. In whole fields we placed the trap units in the centre of the field in order to avoid the influence of adjacent non-productive landscape elements on field margins as much as possible. In the case of field margins we preferably chose plots that were mainly bordered by crops wherever this was possible. The number of trap units was not identical in all vegetation types. No traps were placed in plots with spontaneous growth. The number of trap-units for the other vegetation types varied between three for grass/clover to 16 for leguminous species.

Each set of live-traps was put in place for four consecutive days, preceded by a three-day familiarisation period; this happened in July-August, when population levels of most species are high. The traps were checked every 12 hours and, if necessary, re-set. However, in 1994 we implemented a different trapping scheme in the provinces of Zeeland and Limburg. Here, the traps were put into trapping position only during the daytime. This was caused by a misunderstanding within the team. The small mammals we caught were identified and marked by means of making characteristic cuts in the fur that would enable recognition if the same individual was caught on a subsequent occasion. Repeated catches of individuals were omitted during data-processing.

The census method for the larger mammals was based on direct observation and on such indirect clues to their presence as foot-prints and droppings. Direct observations were useful for diurnal species such as roe deer and common hare. Indirect clues were the main source of information for nocturnal mammals such as the badger *Meles meles*. The data was collected during four regular visits to each plot (early morning, coinciding with the census of breeding birds). In these visits plots were crossed systematically. Observations made during additional visits were also used. To increase the compatibility between the plots regarding the numbers observed, we used the highest number observed on any one of a series of visits to an individual plot.

2.2 Statistics

For statistical analysis we applied a model which allowed for the lack of balance in the total number of experiments. As the unbalanced experimental set-up disallowed a straightforward analysis of variance, we had to resort to an extended version based on the generalised mixed linear model. A further drawback was the incidence of many observations with a zero value. To overcome this problem, the response variates were analysed by means of a quasi-Poisson loglinear mixed model (for an example of this, see Engel & Keen, 1994). A special variant of the generalised mixed linear model, this is able to deal with a large proportion of zero values.

In this paper we present the direct effects of five source variates (vegetation type, plot type, region, year and time of tillage) on two response variates (species-richness and density). As the effects of interaction between source variates appeared to be small, they have been ignored. The response variates are presented as conditional averages, which are means corrected for the effects of the other source variates. Conditional averages are thus more suitable for interpretation than raw averages, as these are influenced by imperfections in the experimental set-up.

Presuming that sowing arable weeds would not be of any importance regarding the effects of management regimes on mammals, we aggregated the data on the regeneration of cereals with and without sowing arable weeds (table 1).

In the analysis we consider an entire field sown with grass/clover as the standard treatment. In addition, we compare all set-aside vegetations with crops for the source variate ‘vegetation type’.

3. Results and discussion

In table 2 and 3 we present the total numbers of individuals caught (small mammals) or sighted (larger mammals). In this tables we present consecutively the total numbers for all plots and the total numbers per source variate (see table 1). Due to the statistical treatment no straightforward comparison can be made with the conditional averages, which are discussed below.

3.1 Small mammals

a. Results

Table 2. Total number of small mammals

	total	Vegetation type					Time of tillage		Plot type		Region			
		crop	gc	ls	ce*	aw*	sp	au	fm	ef	G	Z	Ll	Lz
Number of plots	69	43	3	16	5	2	14	12	6	20	8	6	6	6
Number of catching periods	423	265	21	94	29	14	83	75	42	116	56	36	33	33
Species	number of individuals													
Apodemus sylvaticus	115	89	0	14	9	3	11	15	12	14	12	1	4	9
Clethrionomys glareolus	8	0	0	6	0	2	6	2	0	8	0	0	7	1
Crocidura russula	2	2	0	0	0	0	0	0	0	0	0	0	0	0
Micromys minutus	4	2	0	2	0	0	2	0	0	2	0	0	0	2
Microtus agrestis	14	1	0	12	0	1	12	1	0	13	0	0	1	12
Microtus arvalis	108	37	4	44	13	10	33	38	24	47	11	2	32	26
Mus musculus	13	11	0	2	0	0	2	0	0	2	2	0	0	0
Sorex araneus/coronatus	28	17	10	0	0	1	2	9	10	1	2	9	0	0
Sorex minutus	3	2	1	0	0	0	0	1	1	0	0	1	0	0

See table 1 for explanation of abbreviations
* Aggregated in statistical analysis

Table 3. Total number of larger mammals

	total	Vegetation type					Time of tillage		Plot type		Region			
		gc	ls	ce	aw	sv	sp	au	fm	ef	G	Z	Ll	Lz
Number of plots	124	18	52	13	18	18	67	57	87	37	41	23	28	32
acreage (ha)	141	9	83	4	14	9	105	36	38	103	65	27	27	22
Species	number of individuals													
Capreolus capreolus	23	7	13	1	1	1	16	7	10	13	10	0	4	9
Lepus europaeus	85	17	45	3	9	11	62	23	42	43	40	15	13	17
Martes foina	1	0	1	0	0	0	1	0	0	1	0	0	1	0
Meles meles	1	0	1	0	0	0	1	0	0	1	0	0	1	0
Mustela nivalis	1	0	0	0	0	1	1	0	1	0	0	1	0	0
Mustela putorius	1	0	1	0	0	0	1	0	0	1	0	0	1	0
Oryctolagus cuniculus	18	0	11	3	2	2	9	9	12	6	0	1	14	3
Sus scrofa	40	0	40	0	0	0	40	0	0	40	0	0	0	40
Talpa europaea	8	0	5	0	0	3	6	2	3	5	3	0	4	1
Vulpes vulpes	3	0	3	0	0	0	3	0	0	3	0	0	3	0

See table 1 for explanation of abbreviations

Species

Nine species were encountered (table 2), all are species that are common in habitats strongly influenced by human activity. Of these, the wood mouse *Apodemus sylvaticus* was the most abundant species, while the numbers of common vole were nearly as high. These two species were substantially higher in number than the other species, of which common shrew *Sorex araneus/coronatus* and short-tailed vole *Microtus agrestis* were relatively numerous. Of the remaining species, only small numbers were found.

With regard to species-richness, no significant effects were observed for three out of five source variates (fig. 2). Only the year and time of tillage had a significant effect. The average number of species with autumn tillage (1.2, $p \leq 0.05$) was low compared to the 2.9 species in plots with spring tillage. The average number of species in production crops (1.7) was similar to the species-richness for the different vegetation types on the set-aside plots, which varied between 1.2 and 2.6. In addition, the difference between fields and field margins was also small (2.2 and 1.8, respectively), as was the difference between regions (ranging from 1.6 - 2.4). The species-richness in 1995 was much higher than in 1994 (3.3 and 0.8 respectively, $p \leq 0.05$).

Densities

In general, the effects of the source variates on the density of small mammals (fig. 3) was similar to the effects on species-richness. However, the number of catches on the plots in which regeneration of cereals was practised (2.7, $p \leq 0.05$) was more than twice as high as in production crops (1.2). The difference between production crops and the other vegetation types (0.9 and 1.6) was smaller and not statistically significant. The numbers in plots with autumn tillage were very much lower (0.6, $p \leq 0.05$) than on plots with springtime tillage (2.6). The difference observed for plot type was large, but due to a large CV within the classes this was not statistically significant. As to the effect of the source variate year on species-richness, the numbers were much higher in 1995 than in 1994, but for this variate the difference is not statistically significant.

Differences between species

When the set-aside plots are compared with regular crops, the three most abundant species show varied responses (fig. 4). The common vole is three times more abundant in the set-aside plots than in regular crops. With regard to the wood mouse, the situation is reversed and the difference is somewhat smaller. The common shrew did not show a preference for either of the two categories.

Two factors explain the reversed responses of common vole and wood mouse. Wood mice are an opportunistic and mobile species (Tew, 1989), which is capable both of invading new feeding areas quickly, and of producing offspring there. This behaviour has been observed in a relatively open and inhospitable crop like maize (Hollander & Van der Reest, 1994). Being burrow-dwellers, common voles show a far more restricted exploratory behaviour. Moreover, it has been shown that wood mice are scarce in places with a high population density of common voles (Wammes, 1992). We can do little more than speculate on the relative contribution made by either explanation, but both factors are likely to play a part.

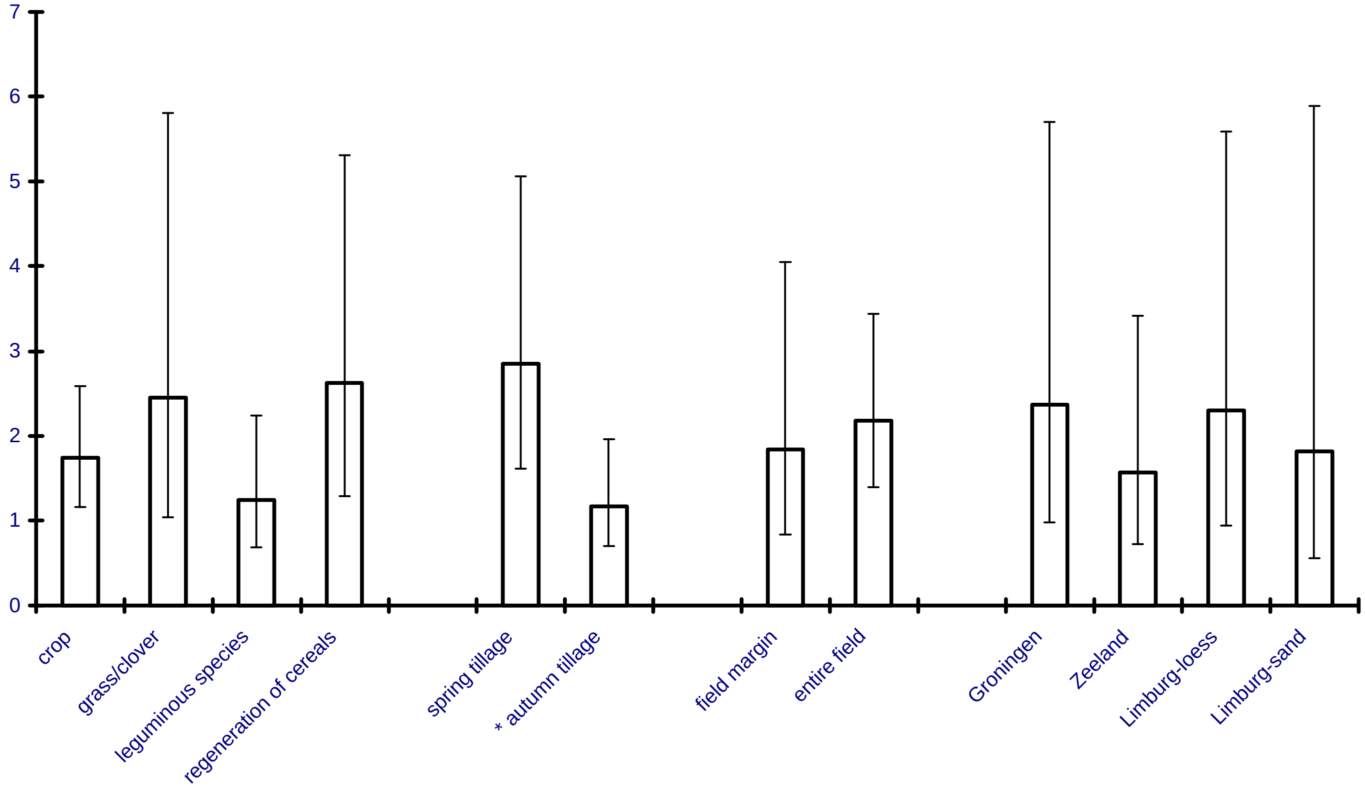

Fig. 2. Small mammals: number of species per plot. Conditional averages and 90% confidence interval. * significant effect ($p \leq 0.05$).

b. Discussion

Annual differences

Species-richness was much higher in 1995 than in 1994; in 1995, numbers also tended to be much higher. This is partly attributable to experimental set-up (see 2.1). In 1994, trapping in the provinces of Limburg and Zeeland was carried out only during daytime, this method is bound to give a low trapping success for species which are active mainly at dusk and during the night. As the wood mouse is one of those species (Tew, 1989) and the most abundant species in our research, it is clear that the difference in methods used in 1994 and 1995 partly explain the effects.

Another important factor is the general fluctuation in the population density of the common vole. This species shows a pattern with peak levels every three years (Jonkers, 1992). With regard to the common vole, numbers were generally lower in 1994 than in 1995, at least in the province of Groningen (Koks, 1995). In our study, the numbers of common voles in 1995 were up to 800% higher than in the preceding year. As the common vole contributes 37% of all observations, the difference explains a substantial part of the effect for the group as a whole. With regard to the other species, it is not clear if general fluctuations in population density have had any effect.

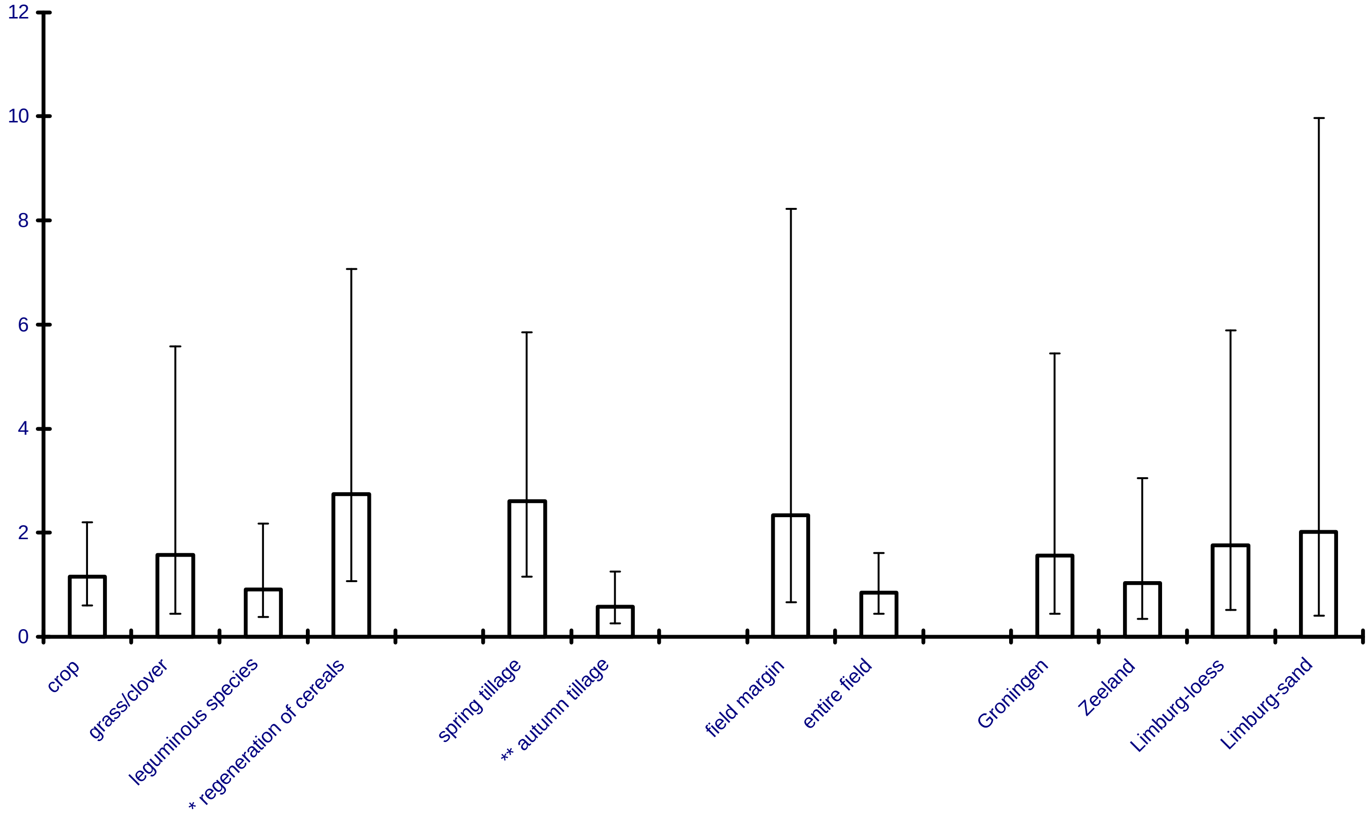

Fig. 3. Small mammals: number of catches per unit per period of 12 hours. Conditioned averages and 90% confidence interval. * significant effect compared to crop ($p \leq 0.05$). ** significant effect ($p \leq 0.01$).

It may be concluded that the differences between the two years will have been largely caused by the two factors specified above.

The availability of food

Relatively high numbers of small mammals were found on the plots in which regeneration of cereals was practised. This was probably a result of the relatively favourable food conditions there. In the first place the cereals themselves can be used as a food source. Furthermore, the highest species-richness of arable weeds was observed on the cereal-regeneration plots; these weeds may also constitute a food source. Finally, the numbers of insects on the plots were generally much higher than in regular crops (Buys et al., 1996). The insectivorous species like shrews may have benefited particularly from this. We therefore conclude that the positive effect of cereal regeneration can be explained by the greater availability of food, together with the long absence of cultivation.

Population build-up

The high numbers of common voles on the set-aside plots indicate the suitability of these fields as habitat, but only for a limited period. The favourable conditions disappear suddenly at the end of summer, when the land is cultivated and the vegetation disappears. This reduces the opportunities for a population build-up, and a large number of small mammals will not survive the cultivating itself. Furthermore, for the small mammals which do survive there is hardly any food left on the bare ground. Predators may also take their chance where there is no cover left. In this way, rotational set-aside can not yield the massive populations characteristic of non-rotational set-aside (e.g. Voslamber et al., 1993).

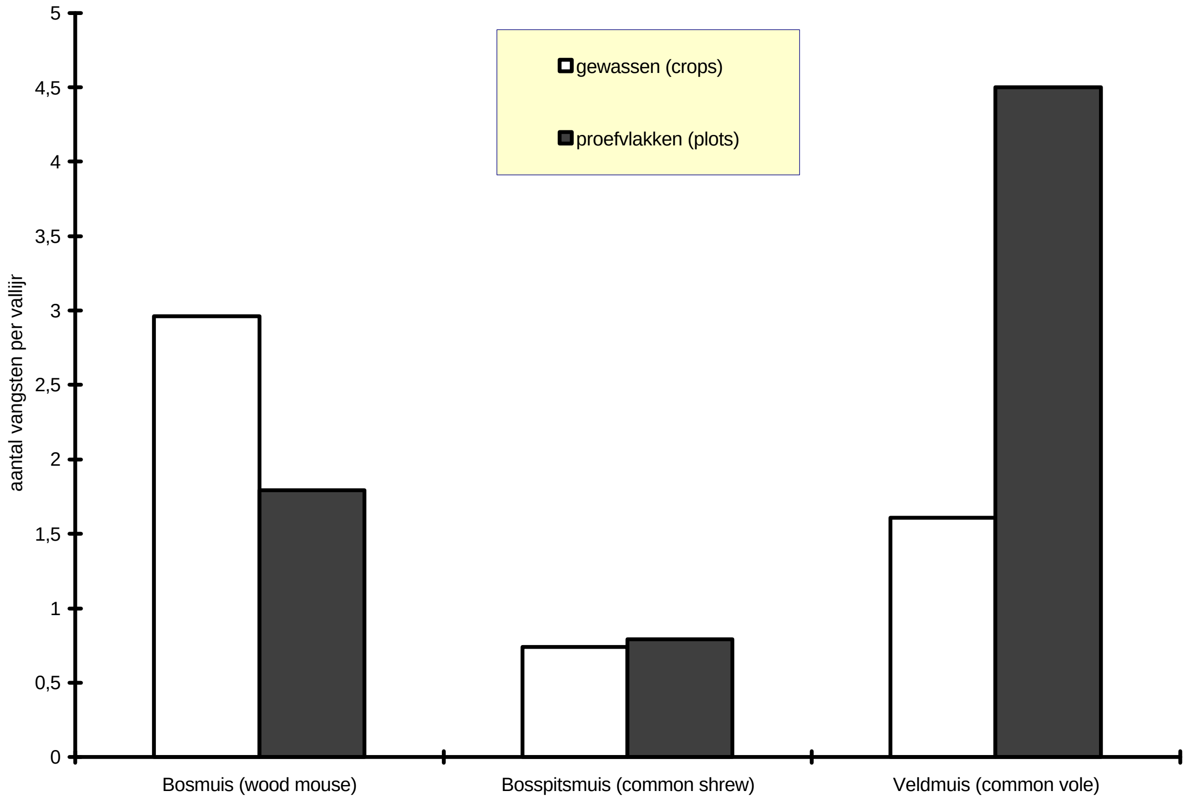

Fig. 4. Numbers per unit of three species in crops and set-aside plots.

Consistently higher small mammal populations may be reached when, each year, new set-aside fields are made available within a short distance of the old fields amply before the latter are cultivated, and when non-productive linear elements such as ditch-margins can be used as migration routes. These landscape elements are extensively used by common voles (Van der Reest, 1989), and every year part of the population uses them to migrate from one field to another. The merits of such an approach, however, are highly speculative, and further research should be done on the spatial effects of rotational set-aside.

Time of tillage

Springtime tillage showed a positive effect, both on species-richness and on small mammal numbers. However, the causes of this are unclear. If a long period of rest were favourable, a negative effect would be expected. Moreover, the regeneration of cereals, which is linked exclusively to autumn tillage, also showed a positive effect. These contradictory effects might be caused by the imperfections in the experimental set-up.

3.2 Larger mammals

a. Results

Species

We observed ten species of larger mammals on the plots (table 3). Roe deer and common hare were by far the most numerous. The numbers of wild boar were also high, but the observations of these were limited to one plot in the province of Limburg. On this plot, which was adjacent to the Meinweg nature reserve, large groups of between 17 and 23 animals were seen, the majority being juveniles accompanied by several adults. They belong to the only population in the Netherlands that is found in an unfenced area (Litjens, 1992). Of the other species, only small numbers were observed.

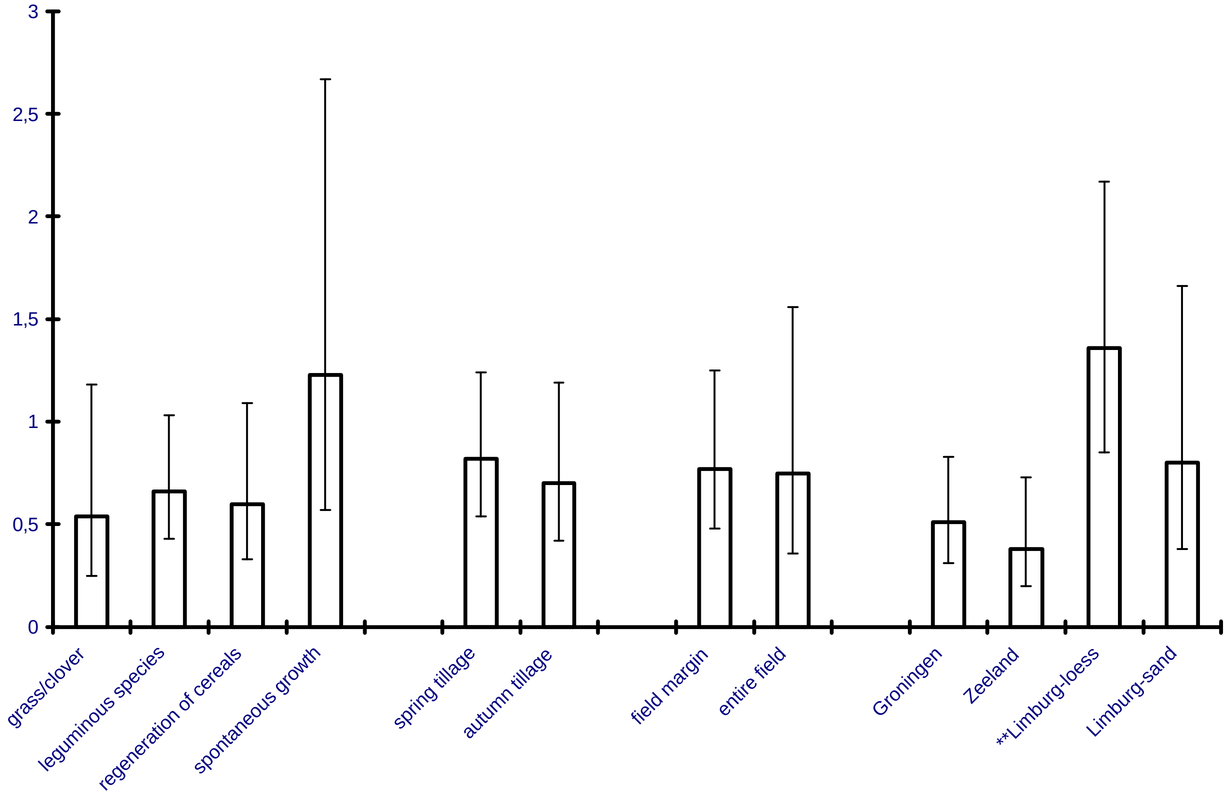

Fig. 5. Lager mammals: number of species per plot. Conditioned averages and 90% confidence interval. ** significant effect ($p \leq 0.01$).

The effect of vegetation type on the species-richness of larger mammals is small (fig. 5), though the value for plots with spontaneous growth (1.2) tends to be somewhat higher than for the other classes (i.e., in the 0.5 - 0.7 range). Although the plot type and time of tillage did not have a significant effect on species-richness, the region did. The number of species in the Limburg loess region (1.4, $p \leq 0.01$) was up to three times higher than in the other regions (in the 0.5 - 0.8 range). There was no significant difference between the two years of research.

Numbers

The effect of the source variates on the number of larger mammals was similar to the effect on species-richness (fig. 6). The plots with spontaneous growth yielded the highest numbers (1.8), although once again these were not statistically significant. Also, the numbers in the Limburg loess region (2.2, $p \leq 0.05$) were higher than in the other regions (0.5 - 1.4). The only serious difference with regard to species-richness was the effect of plot type, which gave low numbers in fields (0.7, $p \leq 0.01$) compared to field margins (1.8).There was no significant difference between the two years.

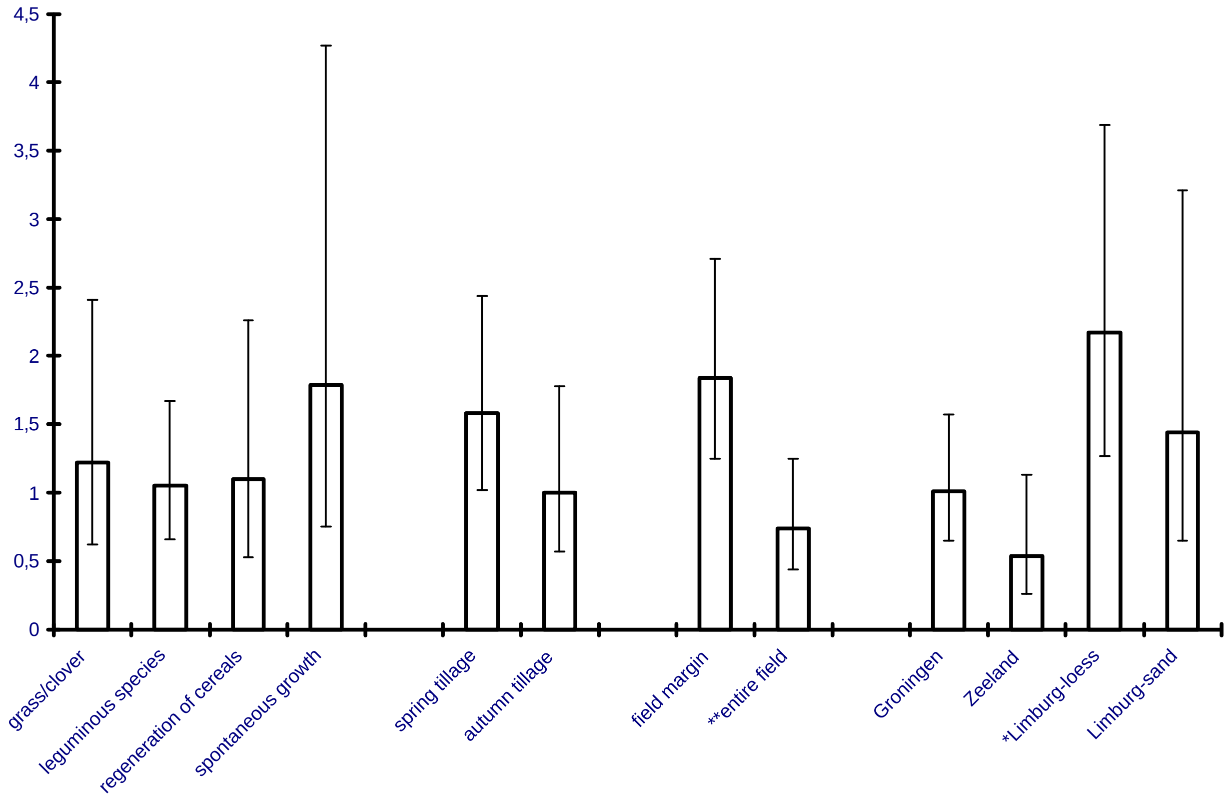

Fig. 6. Numbers of larger mammals. Maximum numbers per visit per plot. Conditioned averages and 90% confidence interval. * significant effect ($p \leq 0.05$). ** significant effect ($p \leq 0.01$)

b. Discussion

Methodological artefacts

Because of the census method used, nocturnal species are very likely to missed. The numbers of badger, beech marten *Martes foina*, polecat *Mustela putorius,* weasel *Mustela nivalis* and to a lesser extend of fox *Vulpes vulpes* and rabbit *Oryctolagus cuniculus* are likely to be underestimated.

The high species diversity and species numbers in the Limburg loess region can largely be explained by the following:

- The geographical distribution of certain species. Limburg has a higher species-richness (Broekhuizen et al., 1992).
- One observer in the Limburg loess region paid more attention to indirect clues than others.

The higher mammal densities in field margins might partly be the effect of the smaller size of the plots. An animal is more likely to be observed on a visit to a small plot than on a visit to a large one.

Field margins

On average, the field margins in our research were more tightly surrounded by non-productive landscape elements (such as ditches and hedges) than are entire fields. It is likely that set-aside land in close proximity to non-productive habitats is more attractive to most of the observed species than land that is completely surrounded by crops. In the former situation, different features are combined within a small area. This, together with the observers' artefact mentioned above, explains the higher numbers of larger mammals found in field margins.

The availability of food

As is the case with small mammals, several species of larger mammals can also use arable weeds and/or vegetation as a food source. For example, roe deer, hares and rabbits may all benefit. Hamsters may also use set-aside land in this way; the incidence of this species is tightly linked to the cultivation of cereals (Krekels & Gubbels, 1996). Although the causes of the decline of the hamster population in the province of Limburg are not thoroughly known, Krekels & Gubbels (1996) assume that the availability of food in early spring and after harvest might be an important factor. When set-aside land of the types we investigated is present, the availability of food is more evenly distributed over the year, due to the prolonged growth of the cover and arable weeds. Fields with cereal regeneration could be particularly attractive to hamsters. We expect this management regime to yield the highest amount of food and therefore to be a promising option in a conservation programme for this highly threatened farmland species.

4. Perspectives

The extent to which nature-oriented management regimes will be applied depends on the willingness of farmers to carry them out. Our research has shown that the costs of such management regimes compared to those of the regular management of set-aside land may vary: with the regeneration of weeds these costs are lower, whereas they are much higher with leguminous species and with the regeneration of cereals in combination with the sowing of arable weeds. Regeneration of cereals (i.e., without supplementary sowing) and setting aside field margins turned out to be about neutral in costs. A second determining factor is the risk of weed development. Our research has shown that noxious weeds are more abundant with nature-oriented management regimes, but that this does not lead to a more intensive weed control (Buys et al., 1997). Finally, farmers' perception of management regimes is important. Farmers prefer sowing a cover (e.g. grass/clover or leguminous species) to the spontaneous growth or regeneration or cereals (Buys et al*.,* 1996).

If we desire to enhance the quality of habitat for mammals by nature-oriented management of set-aside land, regeneration of cereals and setting aside field margins deserve highest priority. Regeneration of cereals requires substantial financial stimuli. Setting aside field margins will require adaptation of the EU regulations on set-aside.

Conclusions

Whereas the regeneration of cereals appeared to be beneficial to small mammals, setting aside field margins benefited larger animals. The differences we found between years (with regard to small mammals) and region (with regard to larger mammals) were largely caused by methodological artefacts.

The merits of any nature-oriented management of set-aside land are primarily the result of lack of agricultural activities over a long period, i.e., at least from early spring to the end of August. For some species this lack of disturbance may be an important feature of using set-aside fields as reproduction areas and/or shelter. A second important factor is the absence of extensive pesticide use, which, relative to the situation in regular crops, creates conditions for the development of a varied vegetation of arable weeds and a rich insect life. Weeds and insects may both be used as a food source.

With these features, set-aside land with nature-oriented management may help in sustaining viable populations of several species. The effect is expected to be larger when this set-aside land is offered in combination with extensively used field-margins. In this way, a network of extensively used agricultural land is present in arable areas that are otherwise cultivated normally. Those species that have suffered from recent developments in Dutch agriculture are expected to benefit specially.

Nature-oriented management of set-aside land deserves promotion, as is has positive effects on mammals and (more strongly) on other fauna and flora.

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Samenvatting

Natuurgericht beheer van braakgelegd land: hebben zoogdieren daar wat aan?

Het Nederlandse agrarische cultuurlandschap heeft de laatste decennia grootscheepse veranderingen ondergaan als gevolg van de modernisering van de landbouw. Dit heeft waarschijnlijk een grote invloed gehad op het voorkomen van zoogdieren in agrarisch gebied. Er is tot nu toe echter weinig bekend over de aard en omvang van deze effecten. Het belang van landbouwgebieden voor natuur- en zoogdierbescherming wordt recent steeds meer onderkend. De laatste jaren is een fors areaal aan akkerland braakgelegd als gevolg van de Europese regelgeving op landbouwgebied. In 1994 en 1995 heeft het Centrum voor Landbouw en Milieu in de provincies Groningen, Limburg en Zeeland op 22 akkerbouwbedrijven onderzoek gedaan naar de effecten van natuurgericht beheer van braakgelegde percelen op flora en fauna, waaronder zoogdieren.

De effecten op aantal en soortenrijkdom van kleine zoogdieren hebben we onderzocht door middel van inloopvallen. Grotere zoogdieren zijn onderzocht aan de hand van directe waarnemingen van individuen en hun sporen. De effecten zijn in relatie gebracht met drie beheersvariabelen: begroeiingstype (gras/klaver, vlinderbloemigen, graanopslag en spontane vegetatie), tijdstip van grondbewerking (voorjaar en najaar) en perceelvorm (percelen en perceelranden). Verder zijn de variabelen regio en jaar betrokken in de analyse van de resultaten.

Op de proefvlakken met graanopslag hebben we meer kleine zoogdieren aangetroffen dan in de andere begroeiingstypen en ook meer dan in productiegewassen. De soortenrijkdom was niet aantoonbaar hoger. Een grondbewerking in het voorjaar resulteerde in hogere aantallen en een grotere soortenrijkdom dan een grondbewerking in het najaar. Een goede verklaring voor dit verschil is niet voorhanden. In 1995 was de soortenrijkdom en mogelijk ook het aantal muizen hoger dan in 1994. De effecten van perceelvorm en regio waren klein en/of niet significant.

Bij de grotere zoogdieren vonden we het belangrijkste verschil bij perceelvorm, waarbij de dichtheden op perceelranden ruim tweemaal zo hoog waren dan die op gehele percelen. Ook vonden we een groot, significant verschil tussen regio's. Dit verschil hangt waarschijnlijk grotendeels samen met de toegepaste methode.

De positieve effecten van graanopslag laten zich waarschijnlijk vooral verklaren door de gunstige voedselsituatie. In de eerste plaats dient het opgekomen graan als voedselbron. Bovendien vonden we een soortenrijke kruidensamenstelling in dit begroeiingstype, welke ook als voedselbron benut kan worden. Het positieve effect van randen heeft waarschijnlijk een relatie met de nabijheid van niet-productieve landschapselementen als (sloot)bermen en bosjes.

Het lijkt duidelijk dat ook roulerende braaklegging voor zoogdieren een nuttige rol kan vervullen door de beschikbaarheid van voedsel, een grote mate van rust en, als de vegetatie zich ontwikkeld heeft, een bruikbare dekking. De precieze effecten zijn door de relatief kleine oppervlakte van de hier onderzochte braakpercelen sterk afhankelijk van omgevingsfactoren.

Bevordering van natuurgericht beheer van braakgelegde percelen door voorlichting en financiële vergoedingen is wenselijk.