WATER BIRDS AND RICE CULTIVATION IN WEST AFRICA

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SUMMARY

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Studies carried out in Senegal and Mali showed that complaints by farmers of losses of rice due to feeding by water birds may be justified. Losses can amount to as much as 10 or 15% of the crop but are usually less than this. The amount of loss varies enormously from one year, from one region, and from one field to another. Data are provided on how losses occur and on the bird species responsible. Methods for reducing losses are discussed.

RESUMÉ

Sur certaines rizières aménagées, les plaintes des paysans concernant les oiseaux d'eau sont nombreuses. Une étude menée au Sénégal et au Mali a montré que certaines de ces plaintes étaient justifiées. Les dégâts peuvent atteindre 10 à 15 p. cent de la récolte dans certaines années mais sont généralement plus faibles. Les dégâts ne sont pas répartis uniformément car certains paysans perdant la totalité de leur récolte alors que d'autres ne subissent aucune perte. Les modalités des dégâts, les espèces responsibles, ainsi que les moyens de les réduire sont étudiés.

INTRODUCTION

Several large wetlands in the Sahel zone just to the south of the Sahara are well known wintering grounds for a multitude of Palearctic migrants. Bird numbers can be enormous, the Anatidae alone accounting for as many as 485,000 birds in the delta of the river Senegal (Diouf 1987), 1,147,000 in the inundation zone of the Niger river in Mali (Skinner et al. 1987) and 870,000 in the Lake Chad basin (Roux & Jarry 1984). On average, these three large areas of water provide wintering grounds for about 1,000,000 Garganey *Anas querquedula* and 500,000 Pintail *Anas acuta*, each year (Monval et al. 1987).

Since many of the species of wetland birds are granivorous it is not surprising that farmers complain about damage to irrigated crops (Tréca 1975). The French Institute of Scientific Research for Cooperative Development (ORSTOM, Institut Français de Recherche Scientifique pour le Développement en Coopération), in collaboration with the Food and Agricultural Organization of the United Nations, has undertaken research in an attempt to establish the amount of damage, how the damage is caused and the species which cause it, and to propose methods for reducing the damage.

STUDY AREA

Research on the damage caused to rice production by water birds has been undertaken in the delta of the river Senegal and in the inundation zone of the Niger river in central Mali. In Senegal, short-strawed erect rice is normally cultivated in well-managed fields where the irrigation process is well controlled. In Mali, on the other hand, the rice is almost all of the long-strawed floating type: irrigation is either not very well controlled (for example in rice development projects) or not controlled at all (in traditional rice fields in the centre of the inundation zone). In Mali, in addition to poor management of the cultivated areas, much of the area surrounding the rice fields is not cultivated and remains in its natural state.

DISTRIBUTION AND AMOUNT OF DAMAGE

Studies have shown that the amount of damage is very variable. Variation occurs between years, between zones and between fields (Tréca, in press a).

In the Senegal delta, water birds were not responsible for any damage to rice in 1973–1974, 1974–1975 and 1975–1976. In 1976–1977, however, Spur-winged Goose *Plectopterus gambensis* and Knob-billed Goose *Sarkidiornis melanotos* caused considerable damage in some rice fields (Tréca 1978). Losses varied among samples from zero to 54.5% and, for the whole area of the delta, were estimated at 4.5%. In 1977– 1978 losses were again considerable and estimated at 7.5% of the total harvest. In the dry season crop in 1978 losses, amounting to as much as 33% in some cases, resulted from feeding by Spur-winged Goose and White-faced Tree-duck *Dendrocygna viduata*. In 1978–1979 and 1979–1980 there were again practically no losses of rice due to water birds.

In Mali, systematic sampling of rice fields showed that losses varied from as little as 0.65% to as much as 13.34% at varying times from January 1983 to December 1986 (Table 1). Anecdotal evidence obtained from cultivators and from ornithologists indicated that losses were very high in 1977–1978 but not in 1978–1979. Some improved areas of rice cultivation suffer more damage than others and, within these areas, some fields might be completely destroyed whilst others have no losses at all. Losses may vary within a small area from as little as zero to 100% (Tréca 1983). Where damage is particularly severe farmers may not bother to harvest the crop, leading to an effective total loss.

SPECIES OF BIRDS CAUSING DAMAGE AND THEIR DIET

When the rice is mature and being harvested, observations of the way in which the grains are taken out of the head (Manikowski & Tréca 1982), the amount of rice left on the ground, and the birds and their abundance in the neighbourhood of rice fields allow some conclusions to be drawn about the species causing most damage to rice (Tréca, in press a). In Mali, ducks (and in particular Garganey and Pintail) are the principal species causing damage to rice (Tréca, in press a). Losses due to these species are usually confined to a small area but in those areas the damage may be considerable and can happen very quickly. As much as 2–4 ha may be lost in a single night from feeding by the large flocks in which these birds usually congregate. Most losses occur when the rice is almost ripe, even when there is still 20–30 or more centimetres of water in the fields and whilst there are still large populations of birds in the vicinity of the rice fields (Tréca 1977).

In Senegal, a study of the diet of Garganey showed that this species is responsible for the loss of about 2% of the annual crop of rice (Tréca 1981). However, the short-strawed erect rice which is the major cultivar is hardly damaged by Garganey because of its growth habit.

Ruff *Philomachus pugnax* cause damage to floating rice in Mali after the fields have been drained but while the heads of grain are still on the ground. Losses occur when the depth of water is less than 10 cm or when the soil is still wet. Losses due to Ruff are more equally distributed over the total crop and are not particularly noticed by farmers. On average, nonetheless, total loss of rice due to Ruff is of about the same magnitude as that caused by ducks (Tréca, in press a). In Senegal, Ruff are not able to damage the short-strawed rice because the erect habit puts the ears out of their reach. Rice does, however, form an important part of the diet of Ruff, particularly from December to April, and it is mainly from rice that Ruff lay down the fat which allows them to undertake the pre-breeding migration (Fig. 1). Rice amounts to 97.7% of the diet of Ruff between December and April, of which 84% is from cultivated rice (Tréca, unpubl. data), most of this being gleaned from the ground after harvest.

Losses due to Afrotropical ducks are less severe than those caused by migrants. In 1986–1987, for example, 0.78% of the crop was estimated to be lost to Spur-winged Goose in central Mali. White-faced Tree-duck were also responsible for some losses in this region.

Black-tailed Godwit *Limosa limosa* also consume some rice, most of which is gleaned from the soil surface. Godwit may also cause some damage to fields just after sowing, on their return from migration. Losses due to Godwit might possibly become more severe if more dry season rice was grown following, for example, the construction of dams such as the one at Diama in Senegal (Tréca 1984). Other birds with smaller populations, such as the Glossy Ibis *Plegadis falcinellus* and the Black Crowned Crane *Balearica pavonina* may also cause minor damage to rice.

Table 1. Rice losses due to birds and other animals in Mali

Area and date	Type of rice field	Number of ears examined	Losses due to water birds			Other losses	
			Overall (%)	Maximum (%)	Main species	Overall (%)	Main species

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Mopti							
January 1983	Development project	13,937	13.3	67.4	Garganey Ruff	0.72	Warthog Pigeons
December 1983–January 1984	Development project	11,645	3.1	40.1	Garganey Ruff	not measured	Rats Insects
January 1986	Development project	8,863	0.7	16.4	Garganey Ruff	0.11	Insects
Dioro							
January–February 1985	Development project	7,778	6.0	61.9	Garganey Ruff	2.69	Quelea
Diaka							
December 1986	Traditional	3,464	0.8	18.5	Spur-winged Goose	8.05	Rats Quelea

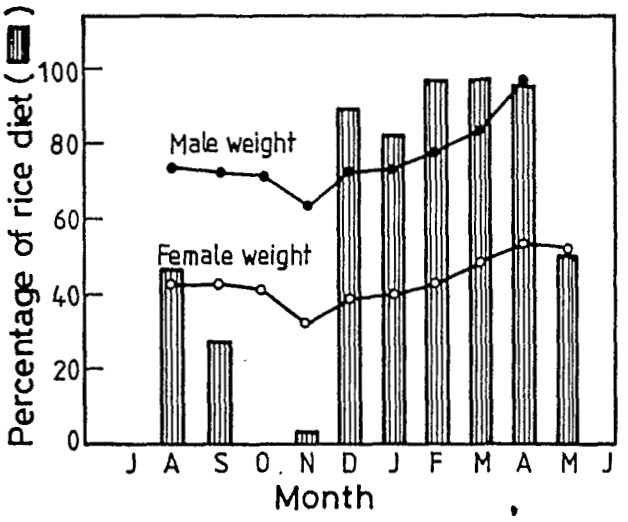

Figure 1. Percentage of rice in diet and relative weight changes of Ruff in Senegal.

REDUCING CROP LOSSES

Large numbers of water birds may cause damage to rice when certain conditions prevail. Predisposing conditions include the availability of roosting areas close to the rice fields, poorly managed fields, and limited areas were birds would naturally feed (for example if the flood level is particularly low). The Anatidae may, for example, land in rice fields where there has been poor crop growth and where there are thus large expanses of open water. From these areas they are able to attack neighbouring areas where rice is approaching maturity. Crops that are particularly at risk are early maturing ones in which the reduction in water level is carried out slowly (Tréca, in press b). Short-strawed erect rice with a dense ground cover is much less susceptible to attack than floating rice.

Several methods can be used to reduce damage to the rice crop, in addition to constant attendance and the usual methods of scaring birds (which in themselves are costly and often difficult to manage). Birds can be diverted from rice fields by ensuring that good agricultural practices are followed. These include not leaving areas of open water in the middle of the rice and preventing the growth of weeds which ripen before the rice does, thus encouraging birds on to the rice fields. A choice of rice varieties which all mature at the same time and over a relatively short period would also lead to reduced damage (Tréca 1985). The time during which rice is available to birds may also be reduced by ensuring that field drainage is carried out as early and as rapidly as possible.

In addition to improved cultural practices, better engineering of the fields would help in preventing damage. Engineering practices leading to a reduction in economic loss include: secondary dykes within the fields, to enable the farmers to survey them more closely; better field levelling, assuring a constant depth of water; strict control of water levels; and cultivation of short-strawed erect rice. These improvements may cost considerable amounts of money but would be economic as they allow not only an improvement in yield but also a reduction in losses on those yields (Tréca, in press b). In addition to these methods, natural feeding areas should be left where birds can feed more easily. If natural areas are destroyed, or if hunting pressure is allowed to become too great, birds will accept greater risks in coming to rice fields to feed (Tréca 1985). In contrast with the case of the Red-billed Quelea *Quelea quelea*, a major pest of rice and millet, there is no question of destroying the population of water birds by any method whatsoever. It is to be noted in passing, however, that in Mali fisherman do capture quite large numbers of water birds in nets both in rice fields and elsewhere (Tréca 1989).

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CONCLUSIONS

These studies on water birds and the losses that they cause have allowed the best methods of reducing losses to be identified. These include preventing birds from coming to feed at fields by proper cultural methods which ensure that rice fields are as clean as possible. The Sahelian countries aim to achieve self-sufficiency in food production. While larger cultivated areas cannot be created in all regions, increased yields can be achieved from the original fields. In the particular case of rice it would be far better to improve productivity in existing irrigated areas than to attempt to create new ones.

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