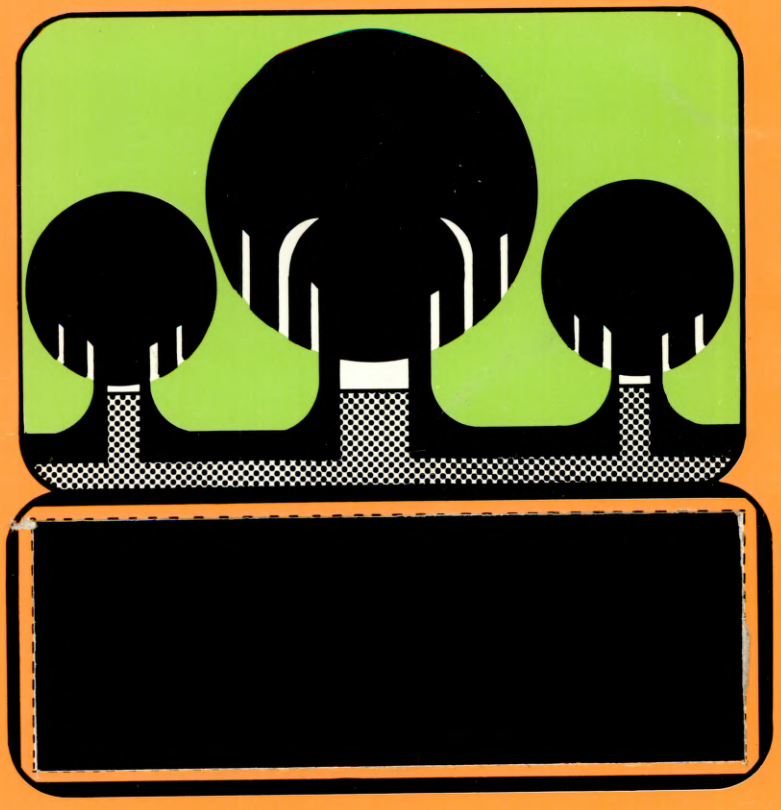
# PROGRAMA SANIDAD VEGETAL





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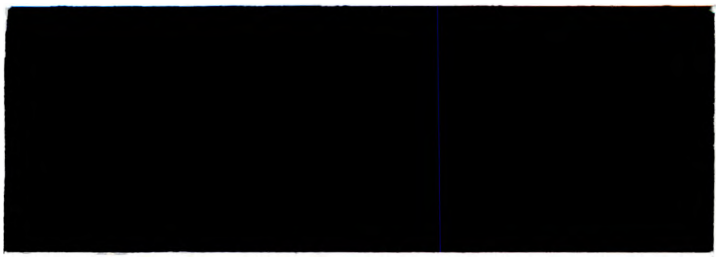

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# Aves depredadoras

## Bibliografía parcialmente anotada

Compilada por:

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# TABLA DE CONTENIDO

# INTRODUCCION

El Programa de Sanidad Vegetal del Instituto Interamericano de Cooperación para la Agricultura-IICA, está cada vez más convencido de la necesidad de agrupar en una sóla actividad fuerte y dinámica, la labor informativa sobre Protección Vegetal, presentando un frente único en el que el trabajo de comunicación sea la preocupación primordial permanente de sus componentes.

En vista de que existe una creciente demanda por parte de los países de la región de contar con información confiable y compatible para preparar planes de investigación y control de los problemas fitosanitarios que en la actualidad los aquejan, se han seleccionado algunos temas de interés para compilar una serie de bibliografías, que permita el acceso a la documentación enforma rápida y exacta sobre determinada plaga o enfermedad.

La presente **Bibliografía sobre Aves Depredadoras** encierra un significativo cúmulo de conocimientos científicos y técnicos y constituye además un recurso acumulativo de información internacional laboriosamente escogido por un grupo de expertos y cumple con uno de los propósitos del Programa, el de promover la información fitosanitaria a nivel Latinoamericano y del Caribe.

Federico Dao
Director
Programa de Sanidad Vegetal

San José, Costa Rica
Agosto de 1981

# INTRODUCTION

The Plant Protection Program of the Inter-American Institute for Cooperation in Agriculture-IICA, is convinced of the need to compile the written information on the subject of Plant Protection into one strong and dynamic activity, where information gathering is the most important and permanent concern of its components.

In view of the growing demand expressed by the countries of the region, for reliable and compatible information for the preparation of research plans and for the control of plant protection problems they are now facing, a series of bibliographies have been compiled on some specific subjects of interest, in order to provide rapid and precise information on plant pests and diseases.

The **Bibliography on Depredatory Birds** gathers a significant amount of scientific-human knowledge, and constitutes a resource of international information that has been carefully selected by a group of experts and thus fulfills one of the goals of the Program: to promote the dissemination of plant protection information throughout Latin America and the Caribbean.

Federico Dao
Director
Plant Protection Program

San José, Costa Rica
August, 1981

## METODOLOGIA

El Comité Consultivo de Sanidad Vegetal aprobó en México, en octubre de 1980, el Programa Operativo del Area Sur (Argentina, Brasil, Chile, Paraguay y Uruguay), de acuerdo con las recomendaciones del Comité Técnico Regional y uno de los temas de dicho Programa es específicamente 'Aves depredadoras'.

El objetivo de la compilación de esta bibliografía por parte del Instituto Interamericano de Cooperación para la Agricultura-IICA, a través del Programa de Sanidad Vegetal y del Centro Interamericano de Documentación e Información Agrícola-CIDIA, es facilitar el conocimiento de los trabajos realizados y respaldar las actividades que se realicen en el análisis de este problema.

La publicación es de carácter mundial y reune 286 referencias.

Los documentos presentados son el resultado de una búsqueda retrospectiva que no pretende ser exhaustiva, realizada con énfasis en los siguientes géneros: *Agelaius*, *Aratinga*, *Cloephaga*, *Columba*, *Cyanoliseus*, *Molothrus*, *Myiopsitta*, *Quelea*, *Sicalis*, *Streptopelia* y *Zenaida*, en las fuentes bibliográficas que a continuación indicamos:

- Abstracts on Tropical Agriculture (Tropical Abstracts (1974-1981)
- Agrindex (1979-1981)
- AGRINTER (Bibliografía Agrícola Latinoamericana) (1977-1981)
- Helminthological Abstracts (1976-1981)
- Review of Applied Entomology (1975-1981)
- Lista de computador del Departamento de Agricultura de los EE.UU. (USDA) (1973-1981)

Para ampliar esta lista bibliográfica incorporamos las referencias citadas por algunos de los autores indizados.

Los resúmenes presentados son: a) tomados de los propios documentos; y b) de los repertorios bibliográficos analizados, con la indicación del volumen y número de la referencia.

La bibliografía está organizada en orden alfabético de autor o título. Indices de autor, geográfico y de especies facilitan el uso de este repertorio.

La Biblioteca Conmemorativa Orton en Turrialba, Costa Rica, facilita el acceso, a través de su Servicio de Fotocopias, de aquellos documentos que están acompañados por un asterisco (*).

Turrialba, Costa Rica
Agosto, 1981

# A G R A D E C I M I E N T O

Agradecemos la valiosa cooperación del Dr. Federico Carlos Meyer, Especialista en Sanidad Vegetal del IICA en Montevideo, Dr. Robert P. Kahn, Fitopatólogo del Departamento de Agricultura de los Estados Unidos de Norteamérica y al Dr. Enrique Bucher, Director del Centro de Zoología Aplicada en Córdoba, Argentina, quienes enviaron documentos y especificaciones sobre las aves depredadoras de interés para la agricultura de la Zona Sur.

# *AVES DEPREDADORAS*

# AVES DEPREDADORAS

ADESIYUN, A. A. Bird damage to cereals grown in the dry season in some parts of northern Nigeria. Samaru Agricultural Newsletter 15(1):34-37. 1973. (001

* AGUIRRE, A. C. Nidificação da *Zenaida auriculata* (Des Murs). Brasil Florestal 3(12):14-18. 1972. (002

AKANDE, M. Some problems concerning the control of bird damage in southwestern Nigeria. Proceedings of the Vertebrate Pest Conference, no. 8:224-225. 1978. (003

ALBRIGHT, J. L. Why not use plastic strips for bird control? Pests of feed. Hoards Dairyman 123(17):1068-1069. 1978. (004

ALI, M. H. *et al.* Bird pests of rice. Newsletter. International Rice Commission 25(1/2):51. 1976. (005

AUSTIN, O. L. The mourning dove on Cape Cod. Bird Banding 22:149-174. 1951. (006

BAKER, R. T. Bird damage to apples. Orchardist of New Zealand 53(5):145-146. 1980. (007

> Nine varieties, including early-(Scarlet Pimpernel), mid-(Cox's Orange Pippin) and late-maturing (Sturmer) varieties were assessed for bird damage to the fruit. Early maturing apples were the most seriously damaged, primarily by starlings /*Sturnus vulgaris*/ and blackbirds /*Turdus merula*/ but Golden Delicious (late-maturing) also suffered heavy damage. Methiocarb applied to Golden Delicious and Red Delicious trees, once or twice at 113 or 226 g/100 litres slightly reduced the amount of damage to individual fruits but not the number of damaged fruits, unsprayed trees suffering the same loss at harvest due to bird damage (54 apples/tree for Golden Delicious). (Horticultural Abstracts 51:1787)

BARROWS, P. L. y HAYES, F. A. Studies on endoparasites of the mourning dove (*Zenaida macroura*) in the southeast United States. Journal of Wildlife Diseases 13(1):24-28. 1977. (008

* BEESLEY, J. S. S. y LEE, P. G. The assessment of bird resistance in sorghum cultivars in Botswana. PANS 25(4):391-393. 1979. (009

> Sorghum can be heavily damaged by birds in Botswana but as control measures are expensive bird-proof sorghums merit consideration. However, varietal resistance is difficult to evaluate because when many varieties are grown close together birds

avoid unpalatable ones, thus giving a false estimate of resistance. This paper describes the performance of a supposedly resistant variety, Savannah 5, when grown in time isolation from other sorghums. Heavy grain losses resulted, mainly due to doves (Columbidae) and weavers (Ploceidae). Consequently, it is suggested that all resistant cultivars be tested in isolation before final release to farmers.

BEETON, R. Controlling birds in crops. Agricultural Gazette of New South Wales 87(6):42-43. 1976. (010

* BENT, A. C. Life histories of North American gallinaceous birds. New York, Dover Publications, 1963. 490 p. (Bulletin, no. 162). (011)

*Zenaidura macroura* Carolinensis (Linnaeus), pp. 402-416: describe sus hábitos y su distribución geográfica; *Zenaidura macroura* Marginella (Woodhouse), pp. 416-417: describe sus hábitos; *Zenaida zenaida* Zenaida (Bonaparte), pp. 417-422: describe sus hábitos y su distribución geográfica.

BESSER, J. F. 4 amino pyridine for protecting crops from birds; a current review. Proceedings of Verterbrate Pest Conference, no. 7:11-16. 1977. (012

_____. Improvements in the use of 4 amino pyridine for protecting agricultural crops from birds. Proceedings of Verterbrate Pest Conference, no. 8: 51-53. 1978. (013

BHATNAGAR, R. K. Bird pests of agriculture and their control. Proceedings of the National Academy of Science (Section B) 46(1/2):245-256. 1976. (014

_____. Significance of bird pests, management and control. Pesticides 1976:74-83. 1976. (015

* BIRD-RESISTANT sorghum considered where damage to corn is severe. Crops and Soils 19(7):21-22. 1967. (016

* BIRDS. In Centre for Overseas Pest Research. Pest control in rice. 2.ed. London, 1976. pp. 207-217. (PANS. Manual, no. 3). (017

BORTOLI, L. Grain eating birds in tropical Africa with special reference to *Quelea quelea*; the environment and damage. International Studies on Sparrows 7(1):37-75. 1975. (018

BOUDREAU, G. W. Factors related to bird depredations in vineyards. American Journal of Enology and Viticulture 23(2):50-53. 1972. (019

* BOYCE, D. V. M. The influence of sowing depth on the removal of grain from winter wheat by starlings. Plant Pathology 28(2):68-70. 1979. (020)

The effect of sowing depth on the probability of grain removal from winter wheat by starlings (*Sturnus vulgaris* L.) was tested at four sites in Humberside during 1977. At each site there was an inverse relationship between sowing depth and the probability of grain removal ranging from 91% probability at depths of 21-30 mm to 21% probability at depths of 41-45 mm.

BREDO, H. J. Le programme des Nations Unies pour le developpement et la protection des cultures. In International Congress of Entomology, 13th, Moscow, 1968. Trudy 2:317-318. 1971. (021

* BUCHER, E. H. Consideraciones ecológicas sobre la paloma *Zenaida auriculata* como plaga en Córdoba. Argentina. Ministerio de Economía y Hacienda. Serie Ciencia y Técnica, no. 1. 1970. 11 p. (022

This is a preliminary report concerning with studies that are being carried out related to the ecology of the dove *Zenaida auriculata*, a serious pest of agricultural lands of the eastern plains of Córdoba. The climatic characteristics and the distribution of both natural and cultivated vegetation is determined, and in addition, roosting and nesting areas are mapped. General information about the dispersion, food and reproductive habits is given. Finally, the probable factors which have caused the population increment of these birds are analyzed. Two are the major operative factors apparently: 1. The creation of a "mosaic pattern landscape" made up of thornshrubs and croplands. This situation offers both, roosting-breeding places and abundant food supply. 2. The intensive sowing of sorghum (for grain and grazing) that allows the existence of an important source of food during a long period of the year. Thus, it may be assumed that in every region showing similar conditions, the appearance of such factors would create a favorable environment for *Zenaida auriculata* population outbreak that reach plague magnitude. In fact, this phenomenon is already found in many areas of Argentine where agriculture is replacing native woodlands.

* _____. y NORES, M. Alimentación de pichones de la paloma *Zenaida auriculata*. El Hornero (Argentina) 11(3):209-216. 1973. (023

During 1970 crop samples were taken from nestlings of the eared dove, *Zenaida auriculata chysauchenia*, in the eastern plains of Córdoba, Argentine Republic, where this dove has become a serious agricultural pest. Seeds and crop milk are the most important food items. No fruits or animal food were found. During the first days of the nestling's life, crop milk plays an important role, which rapidly decreases afterwards. The seeds of cultivated species are predominant, being mainly sorghum, millet, wheat, peanut, sunflower and maize. Important weed seeds are *Amaranthus* spp. (Amaranthaceae),

*Chenopodium* spp. (Chenopodiaceae), *Argemone subfusiformis* (Papaveraceae), *Setaria pampeana* and *Echinochloa colonum* (Graminae). Nestling's crops have more small seeds and less medium and large size seeds than the average adult crop content. Large seeds are absent during the first four days of life. Differences between adult and nestling food became less and less apparent as the nestling grows. It means that availability of small seeds is necessary during the breeding period, or at least during early stages of the nestling's life. Adults rearing chick (as indicated by milk secretion) tend to feed on smaller food items ($p<0,01$) than the rest. Nevertheless, large seeds are also found in their crops in smaller proportions. These data are consistent with the hypothesis that the greater proportion of smaller seeds in the nestling's food is explained by both the deliberate choice by the parents and some sort of selection during the regurgitating of food from the adult to the chick.

* BUCHER, E. H. Bases ecológicas para el control de la paloma torcaza. Revista de la Facultad de Ciencias Exactas, Físicas y Naturales de Córdoba (Nueva Serie), Biología 1:141-156. 1974. (024

The eared dove *Zenaida auriculata* is a considerable agricultural problem to some South American countries, being especially serious in Argentina. Sorghum, millet, wheat, sunflower and soybeans are the most serious affected crops. The problem generally arises where the development of agriculture creates a mosaic of croplands and patches of secondary scrub. Although large numbers are killed by spreading toxic baits - the traditional method of control in Argentina - it seems that the problem cannot be solved. The present understanding of the dynamics of avian populations makes clear that this method (like any other technique of killing doves at present available) can not exceed the deaths from natural causes in such big and mobile populations, resulting in the elimination of birds that were anyway going to die as a result of competition for limited resources. The situation resembles in some way the quelea problem in Africa, and the experience gained there is applicable to this case. A new strategy is proposed, aimed at obtaining crop protection through other means than permanent bird destruction. It suggests the use of the following elements: 1. Early harvesting at high humidity content plus eventual artificial drying; 2. Harvest-aid chemicals to speed drying; 3. Bird damage resistent sorghum varieties; 4. Repellents; 5. Bird destruction (only at the time and place where damage occurs). The possibility of employing aerial spraying of potent avicides, such as is practiced in Africa, is considered. It is concluded that health and pollution hazards in a rather well populated area make this technique in principle unsuitable to the Argentine situation. The avoidance of drastic measures such as habitat alteration by removing the wooded patches is also recommended, because availability of roosting places does not seem to be a limitant factor. Furthermore, in many cases there are also clear and important reasons for the protection of such forested areas.

* BUCHER, E. H. y DI TADA, I. E. Determinación de la edad en pichones de la paloma torcaza (*Zenaida auriculata chrysauchenia*). Physis, C (Argentina) 34(88): 83-89. 1975. (025

A method for calculating the age of nestlings of *Zenaida auriculata chrysauchenia* is presented. Photographs of nestlings of known age and descriptive notes that emphasize the key characters of age at consecutive days of growth are included. A formula was developed using multiple discriminant analysis to predict age to the nearest within one day. The formula is:

$$d = -0.066\ x_1 + 0.382\ x_2 + 0.749\ x_3 + 0.536\ x_4$$

where $x_1$ = body length; $x_2$ = length of tibiotarsus; $x_3$ = length of longest primary remige; $x_4$ = length of longest rectrix (all measurements in mm). The intervals and centroids of the values of d (discriminant score) for each day of age are indicated.

_____. y NORES, M. Ecología de la alimentación de la paloma *Zenaida auriculata*. Physis, C (Argentina) 35(90):17-32. 1976. (026

* _____. y BEDANO, P. E. Bird damage problems in Argentina. International Studies on Sparrows 9(1):3-16. 1977. (027

* _____., FERRERO DE ROQUE, M. T. y ORUETA, A. Caracterización de los estadios de incubación en huevos de la paloma torcaza (*Zenaida auriculata*). Physis, C (Argentina) 36(92):163-168. 1977. (028

Detailed descriptions and reference photographs for determining incubation stages in Eared Dove eggs are given.

_____. Ecología comparada de la paloma *Zenaida auriculata* en la caatinga y el chaco austral. In Congreso Latinoamericano de Zoología, 7°, Tucumán, Argentina, 1977. Resúmenes. s.l., s.e., 1977. pp. 66-67. (029

* _____. *et al.* Ecología de la reproducción de la paloma, *Zenaida auriculata*. I. Variaciones estacionales en peso corporal, gonadas, reservas de lípidos y muda. ECOSUR (Argentina) 4(7):47-67. 1977. (030

The seasonal cycle of *Zenaida auriculata chrysauchenia* was studied in Córdoba, Argentina (31°S), where the bird has become a serious agricultural pest. Monthly samples were obtained from June 1970 to November 1972. A total of 3,650 individuals was analysed. Body weight was on average heavier in winter (May-October) than in summer and autumn (November-April). Males were about 5% heavier than females throughout the year, and juvenile were lighter than adults. Significant differences in weight were found between localities, being related to the proportion of cultivated land in each area. On the average, males had an annual cycle in gonad weight showing a minimum from May to July, but males producing sperm were found

throughout the year. There was no demonstrable cycle in females. Significant differences in testis weight between localities were also found. Apparently, abundance of food and photoperiodic changes to a lesser degree, are involved in the regulation of the sexual cycle. Body fat reserves tended to be higher in winter. The proportion of birds showing fat accumulation raised to a peak in May 1972 (83%), following a extremely poor rainy season. At the same time, part of the colonies deserted the area, indicating that a migratory or nomadic process was involved. Moulting season extends on average from October to July, but great variation occurs. Among the birds showing crop gland milk production, the proportion of those with growing primaries was significantly less than in the rest, suggesting that moult can be arrested for breeding. Double moult was recorded in ten individuals. Similarities between the annual cycle of *Zenaida auriculata* and those of several arid land pigeons of Australia and Africa are discussed.

* BUCHER, E. H. y ORUETA, A. Ecología de la reproducción de la paloma *Zenaida auriculata*. II. Epoca de cría, suceso y productividad en las colonias de nidificación de Córdoba. ECOSUR (Argentina) 4(8):157-185. 1977. (031

In central Argentina, eared dove populations have increased enormously since the late fifties as a consequence of the expansion of agriculture and the introduction of grain sorghum as a main crop. Following this build up in numbers, several semi-permanent breeding colonies have been established in the area. From 1970 through 1972 two of these roosts were visited weekly for a detailed study of nesting biology. Habitat and nest site preferences are described. Active nests were found in all months of the year. In general, nest density reached a peak (about 3,000 nests per hectare) in February-March and minimal values during winter (June-July), but considerable variations were found between years. The breeding population at peak densities was estimated in about three million birds in each colony. Hatching success was 49% and nestling success 75%, breeding success being 37%. Great variations in success were registered between places and years. Causes of failure are discussed, being mainly due to predation. Estimations of productivity are given. Nest density and breeding success appeared to be correlated with availability of food, particularly grain sorghum, which seems to be the main proximate factor controlling the breeding of *Zenaida auriculata*. At the same time some degree of photoperiodical influence is likely to occur, at least in certain individuals. The significance of communal breeding in the eared dove is discussed. Finally, a list of the breeding colonies detected in Córdoba is included.

BURGGERS, R. L. Protecting ripening sorghum with methiocarb from bird damage in Senegal. Proceeding Bird Control Seminar, no. 7:267-274. 1976. (032

* BURGGERS, R. L. y RUELLE, P. Bird losses in Senegal rice significantly cut. Rice Journal 80(10):10-14. 1977. (033

Methiocarb treatments of 0.53 to 0.83% by seed weight reduced bird losses to sown rice in the Senegal River Valley. At the two trial sites (Boundoum and Nianga) 1.1 and 2.0 times more seedlings and 2.7 and 4.4 times fewer birds were counted in treated and control plots, respectively. At Nianga, 1.5 times more rice also was harvested from the treated than control plot. Ruffs (*Philomachus pugnax*) were the main pest species in both trials.

_____. The situation of grain eating birds in Somalia. Proceedings of the Vertebrate Pest Conference, no. 9:5-16. 1980. (034

CACCAMISE, D. F. Corn hybrid resistance to bird damage. Breeding for resistance. Del City Farm Home News 62(12):6. 1977. (035

CALVI, C. *et al.* Protecting Uruguayan crops from bird damage with methiocarb and 4 amino pyridine. Proceeding Bird Control Seminar, no. 7:255-258. 1976. (036

* _____. Protección de cultivos de verano del daño por aves. Uruguay. Ministerio de Agricultura y Pesca. Hoja de Divulgación, no. 6. 1978. 2 p. (037

* CAMARA-SMEETS, M. DA. Les dégâts d'oiseaux au Berbéré au Tchad et au Nord-Cameroun. A. Enquête: détermination des espèces responsables; indications pour la lutte. Agronomie Tropicale 32(3):262-267. 1977. (038

Dans une région de 420/300 km au Sud du Lac Tchad où la culture du sorgho de décrue ou "berbéré" est importante, et généralisée, on a établi un relevé des dégâts aviaires et des espèces responsables dans le but de mieux évaluer et adapter les méthodes de lutte et de protection antiaviaires. Les méthodes choisies sont simples et rapides, basées sur une méthode rapide d'estimation des dégâts, le comptage routier des différentes espèces et le comptage des oiseaux sur les camps, donnant des ordres de densité par espèce déprédatrice, ce qui permet un nombre de mesures dans l'espace et le temps suffisant pour obtenir à grande échelle une image claire des dégâts subis et des oiseaux responsables. On a dégagé l'existence de plusieurs zones dans la région étudiée d'après la densité des différentes espèces aviaires déprédatrices et les différences dans les dégâts qui en résultent. Au Sud du Lac Tchad, on trouve une zone à prédominance de *Passer*, la région de Ndjamena accueille un ensemble de granivores déprédateurs, y compris le *Quelea* a partir de fin décembre; de Waza à Maroua, seul le *Quelea* est présent en grand nombre et au Sud de la région considérée vers Léré et Garoua *Ploceus cucullatus* prédomine avec *Quelea*. La lutte habituelle "antiquéléa" menée actuellement peut seule éviter les dégâts

dans la région de Moroua-Waza et les réduire dans la région de Ndjamena et Garoua-Léré. D'autres formes de lutte (protection directe, appâts empoisonnés, dénichage) visant les autres granivores sont nécessaires pour l'ensemble de la région envisagée.

* CAMARA-SMEETS, M. DA. Les dégâts d'oiseaux au Berbéré au Tchad et au Nord-Cameroun. B. Etude des dégâts sur une parcelle choisie et détermination de la responsabilité relative des différentes espèces impliquées. Agronomie Tropicale 32(3):268-278. 1977. (039

Sur une parcelle de Berbéré, en bordure d'un complexe cultivé étendu, choisie à proximité d'un marigot qui sert d'abreuvoir aux différentes granivores, on a étudié l'évolution du nombre et des espèces d'oiseaux, du pourcentage de dégâts sur le champ et des contenus de jabots des oiseaux capturés sur le champ et à l'abreuvoir. Les dégâts débutent des l'épiaison et se poursuivent réguilièrement jusqu'à la maturation des grains. Le nombre total d'oiseaux présents augmente brusquement au moment où les grains passent du stade pâteux au stade mûr. Cette augmentation résulte de l'augmentation en effectifs de la plupart des espèces présentes avec une nette prédominance des *Quelea*, suite au regroupement des oiseaux autour des points d'eau. L'analyse des contenus de jabots des différentes espèces et de la quantité de nourriture quotidiennement nécessaire à chacune d'elles, permet, en fonction du nombre d'individus observés, de déterminer leur responsabilité relative dans les dégâts effectués. Les *Lamprotornis* qui attaquent violemment les cultures dès les premiers stades de maturation et les *Quelea* qui s'abattent en vols sur les champs à partir du stade pâteux-mûr, provoquent à eux seusl 75% des dégâts.

CARLTON, R. L. Controlling bird damage to fruits and vegetables. Georgia. University. Cooperative Extension Service. Leaflet, no. 245. 1976. 3 p. (040

_____. Controlling bird damage with repellents. Georgia. University. Cooperative Extension Service. Leaflet, no. 259. 1976. 8 p. (041

CARPENTER, J. W. Food habits of the mourning dove in northwest Oklahoma. Journal of Wildlife Management 35:327-331. 1971. (042

CHAHAL, B. S., SIMWAT, G. S. y BRAR, H. S. Bird pests of crops and their control. Pesticides 7(5):18-20. 1973. (043

CHOPPIN DE JANVRY, E. Note on the nature and amount of damage caused by pigeons in France. Plant Health Newsletter Publication, B 84:14-20. 1978. (044

CHOPRA, S. K., MAHAJAN, J. R. y VIR, B. S. Birds are a serious menace to horticultural crops. Indian Farming 21(10):24-27. 1972. (045

COPING WITH our feathered enemies. Birds as crop pests. Bird Farmer Stockbreed 6(169):44. 1978. (046

COWAN, J. B. Life history and productivity of a population of western mourning doves in California. California Fish and Game 38:505-521. 1952. (047

CRABB, A. C. Bird damage research at the University of California, Davis. Proceedings of the Vertebrate Pest Conference, no. 8:36-39. 1978. (048

_____. y MARTIN, L. R. Protection of Californias agriculture from starling house finch pigeon, house sparrow and crowned sparrow damage; a review of applied and experimental techniques. Plant Health Newsletter Publication, B 84:158-180. 1978. (049

CROOK, J. H. y WARD, P. The Quelea problem in Africa. In Murton, R. K. y Wright, E. N., eds. The problems of birds as pests. New York, Academic Press, 1968. pp. 211-229. (050

* DAVIS, C. A. y ANDERSON, M. W. Seasonal food use by mourning doves in the Mesilla Valley, South-Central New Mexico. New Mexico Agricultural Experiment Station Bulletin, no. 612. 1973. 21 p. (051

Foods eaten by mourning doves (*Zenaida macroura*) in the Mesilla Valley of southern New Mexico during 1967-68 and 1971 were studied by analysis of crop (craw) contents. Principal foods were seeds, nuts, and tubers of agricultural crops and weeds. Those which served as staples in at least one season were fragments of pecan (*Carya illinoensis*), tubers of nutgrass flatsedge (*Cyperus rotundus*), and seeds of cupgrass (*Eriochloa* sp.), desert horsepurslane (*Trianthema portulacastrum*), sorghum (*Sorghum bicolor*), barley (*Hordeum* sp.), and johnsongrass (*Sorghum halepense*). The first four of these have not been previously shown to be staple foods by mourning doves. Sorghum was the principal food in all seasons. Present food supplied support a dove population of some density in the Mesilla Valley. However, approximately 80% of the farmland is devoted to crops which are not used by doves for food. Changes in the supply of dove foods in the valley are expected. Urbanization is exerting a negative effect, whereas the addition of pecan orchards may be favourable. The area devoted to grain farming is increasing, but new farming and feedlot practices which minimize loss of grain or pecans, or reduce weed abundance tend to reduce the supply of dove foods. Any plantings for doves should include sorghum, the preferred food in this study. Leaving small areas of grain unharvested, but pushed down, would increase food availability. If fields are not plowed soon after harvest, they will continue to provide weed seeds and/or waste grain for doves.

DAVIS, L. R. The monk parakeet, a potential threat to agriculture. Proceedings of the Vertebrate Pest Conference, no. 6:253-256. 1974. (052

DAWSON, D. G. y BULL, P. C. A questionnaire survey of bird damage to fruit. New Zealand Journal of Agriculture 13(2):362-371. 1970. (053

DE GRAZIO, J. W. y BESSER, J. F. Los pájaros silvestres se comen millones de dólares. Agriculture in the Americas 23(6):10, 15, 29. 1974. (054

_____. World bird damage problems. Proceedings of the Vertebrate Pest Conference, no. 8:9-24. 1978. (055

DEHAVEN, R. W. Bird damage appraisal methods in some agricultural crops. Proceedings of the Vertebrate Pest Conference, no. 6:246-248. 1974. (056

DENVER WILDLIFE RESEARCH CENTER. Vertebrate damage control research, Quelea bird problems in African agriculture, 1973 annual report. Denver, Colorado, 1974? 21 p. (057

_____. Quelea: control of damage to small grains; 1975 annual progress report. s.l., U.S. Agency for International Development, 1976. 16 p. (058

DIEPENDALE, J. Silos de mais: un anti-gospi. Contre les etourneaux, le filet est la seule protection efficace. Agri-Sept., no. 754:31. 1979. (059

* DILKS, P. J. Diet of feral pigeons (*Columba livia*) in Hawke's Bay, New Zealand. New Zealand Journal of Agricultural Research 18(1):87-90. 1975. (060

Feral pigeons were collected throughout the year from two areas in Hawke's Bay and their crop contents were identified and measured by volumetric displacement. In both areas peas were the most important food, accounting for 54% of the year's diet for Havelock North birds and 60% for those at Cape Kidnappers; maize constituted 23% and 24% of the annual diet, respectively. Barley, subterranean clover, ryecorn, broad beans, black nightshade berries, iceplant, earthworms, slugs, and snails were taken in smaller quantities. Feeding on newly sown peas and ryecorn could have caused economic loss, but most of the food was waste peas and maize from stubble.

DILLON, O. W. Mourning dove foods in Texas during September and October. Journal of Wildlife Management 25:334-336. 1961. (061

* DOGGETT, H. Bird-resistance in sorghum and the *Quelea* problem. Field Crop Abstracts 10(3):153-156. 1957. (062

Quelea do an enormous amount of damage to African grain crops, including sorghum. The two approaches to the problem are to attempt to reduce the bird population by attacking the birds in their nesting and roosting sites; and to breed sorghum varieties which will be less subject to bird damage. Several workers in Africa are attempting to breed bird-resistant sorghum. A disintegrating bitter principle in the grain, large glumes, and a goose-neck are the principal characters being used. Experimental results giving a measure of the degree of bird-resistance obtained have yet to be published.

DOROW, E. Die webervogelplage in Afrika. Landwirt in Ausland 6(2):25-27. 1972. (063

DOWNING, R. L. Significance of ground nesting by mourning doves in Northwestern Oklahoma. Journal of Wildlife Management 23:117-118. 1959. (064

* DUNNING, R. A. Bird damage to sugar beet. Annals of Applied Biology 76(3): 325-335. 1974. (065

Pest damage to sugar beet, including that by birds, has been recorded since 1957. During that time damage by rooks has decreased almost to nil, but some other bird damage has greatly increased, most probably as a result of changing agronomic practices, especially the extensive use of herbicides, the introduction of monogerm seed, and the increasing practice of "planting-to-a-stand". The most severe bird damage in the spring is grazing by several species, and in early summer localized felling of plants by pheasants. Observations in the mid-1960's of causes of seedling and plant losses suggested that birds were then of minor importance; the British Sugar Corporation currently consider that birds are the most serious pest of sugar beet. The distribution of the reported damage does not seem to follow any national pattern. In small-plot field trials possible repellent materials such as anthraquinone, methiocarb or thiram, applied to seed or foliage, did not decrease the extent of grazing.

* EDGAR, W. H. e ISAACSON, A. J. Observations on skylark damage to sugar beet and lettuce seedlings in East Anglia. Annals of Applied Biology 76(3): 335-337. 1974. (066

EDWARD, N. Woodpigeons and other friends. Bird pests. Big Farm Management 1978:93. 1978. (067

* ELLIOTT, C.C.H. The harvest time method as a means of avoiding Quelea damage to irrigated rice in Chad and Cameroun. Journal of Applied Ecology 16(1): 23-35. 1979. (068

Studies on bird damage to irrigated rice were carried out from 1975-77 on two irrigated farms at Bongor, Chad and

Yagoua, Cameroun. The level of damage in relation to the timing of the harvest was measured in order to assess the effectiveness of the harvest timing method of avoiding damage by migratory birds. The quelea was considered the only serious bird pest. Observations on the movements of the Lake Chad Basin quelea population and on the time of arrival of the birds in the rice fields, suggested that the safe period for the vulnerable stages of the rice crop was relatively short, from about mid-May to mid-June. In one season, the Yagoua harvest fell within this period and damge was negligible at <1%. On the other occasions, when the harvest overlapped with the birds' arrival, damage varied from 13 to 26%. The reasons for these differences was discussed. It was concluded that while the harvest timing method can eliminate quelea damage in some years, the practical difficulty of timing the crop to a precise period means that, in other years, when the harvest is late because of unforeseen circumstances, the spraying of nearby roosts with avicides by bird control units will be necessary.

FACCINI, J. L. H., GAUD, J. y ATYEO, W. T. Descrição de eurydiscalges G. N. (Analgidae, Sarcoptiformes), com quatro especies novas parasitas de Psittacidae Aves), provenientes da America do Sul. Revista Brasileira de Biologia 36(3):701-707. 1976. (069

FAO CONFERENCE ON QUELEA BIRD AND WATER HYACINTH CONTROL IN AFRICA, DOUALA, CAMEROON, 1965. Report. Rome, 1965. 29 p. (070)

THE FERAL PIGEON. London. Ministry of Agriculture, Fisheries and Food. Her Majesty's Stationery Office. Advisory Leaflet, no. 601. 1976. 5 p. (071

FITZWATER, W. D. y PRAKASH, I. Handbook of vertebrate-pest control. Rev. ed. New Delhi, Indian Council of Agricultural Research, 1978. 95 p. (072

FLANAGAN, W. Bombarding crows with noise. Bird pest of peanuts. Peanut Journal of Nut World 57(12):9, 12. 1978. (073

FORBES, J. E. y BROWN, L. P. The New York monk parakeet retrieval program. Transactions of the Northeast Section of Wildlife Society 31:155-158. 1974. (074

FRITH, H. J., McKEAN, J. L. y BRAITHWAITE, L. W. Sexual cycles and food of the doves *Streptopelia chinensis* and *S. senegalensis* in Australia. Emu 76:15-24. 1976. (075

FUNMILAYO, O. y ARANDE, M. Nigeria: the problem of bird pests. SPAN 22(1):30-32. 1979. (076

About 10 bird species can become important pests in Nigeria. Most important are the weaver birds and quelea species, which

may cause considerable losses in cereal crops. Quelea control can be obtained by night-time use of explosives, petrol bombs, flame throwers or organophosphorus poisons. Weaver-bird control has failed probably due to inadequate knowledge of the population ecology. Use of avicides is indicated with special attention of the use of fenthion in low dosages. The development of chemicals to inhibit reproduction is suggested. (Abstracts on Tropical Agriculture 5:27468).

GALLARATE, G. Danni arrecati da alcuni animale vertebrati ai seminati. Sementi Elette 22(1/2):115-119. 1976. (077

* GILLIARD, E. T. Living birds of the world. New York, Doubleday, 1958. 400 p. (078

Se da una pequeña reseña sobre *Quelea quelea* (pp. 384-385).

* GOCHFELD, M. Ecologic aspects of ectopic populations of monk parakeets (*Myopsitta monachus*) and possible agricultural consequences. Journal of Agriculture of the University of Puerto Rico 57(3):262-270. 1973. (079

Poblaciones ectópicas del periquito *Myopsitta monachus*, derivadas de aves importadas para el mercado de animales caseros se encuentran actualmente en Puerto Rico, la zona metropolitana de Nueva York y otras localidades. La especie normalmente habita en la parte meridional de Sur América, y ha dado pruebas de ser tolerante a una gran variedad de climas, habitats y fuentes de alimento. Se ha reproducido con éxito en el hemisferio norte. El potencial de crecimiento de las poblaciones actuales se desconoce. Un examen de sus hábitos alimenticios demuestra que la especie es potencialmente dañina para la agricultura. Es indeseable permitir que especies exóticas se introduzcan a una nueva área. Aun cuando la especie se haya estudiado bien y parezca ser beneficiosa, es posible no prever consecuencias dañinas cuando se establece un nuevo ambiente. Es importante estudiar cuidadosamente las nuevas poblaciones de periquitos si éstos no se han de exterminar. Sin embargo, hay suficientes pruebas para persuadirnos a creer que la exterminación es aconsejable.

GOSZCZYNSKI, J. Connections between predatory birds and mammals and their prey. Acta Theriologica 22(30-36):399-430. 1978. (080

GOUDSWAARD, J., VAERMAN, J.-P. y HEREMANS, J. F. Three immuno-globulin classes in the pigeon (*Columba livia*). International Archives of Allergy and Applied Immunology 53(5):409-419. 1977. (081

GRAMET, P. Agriculteurs et oiseaux: un dialogue dificile. Agriculture 371: 314-316. 1973. (082

GRAMET, P. y DAVOUST, P. Un "probleme etourneaux" hors du commun. Agric. Rev. Men. Tech. Econ. 364:106-107. 1973. (083

_____. Le point sur l'etourneau sansonnet. L'Action Vet. 725:37-40. 1977. (084

_____. Les oiseaux contre l'agriculture. Fermes Mod. 63:46-49. 1978. (085

_____. Lutte contre les oiseaux ravageurs. Fermes Mod. 65:43-47. 1978. (086

_____. Protection des cultures contre les oiseaux. Fermes Mod. 66:43-46. 1978. (087

_____. Merles et grives. Jardins de France, no. 10:269-270. 1979. (088

_____. Se defendre contre les "charmants volatiles" qui par millions s'abattent sur nos cultures. France Agricole 35(1797):29, 31. 1979. (089

_____. Voliere piege pour etourneaux: une techniques simple a promouvoir. Defense des Vegetaux, no. 200:240-250. 1979. (090

GRANETT, P. *et al.* Sampling corn for bird damage. Journal of Wildlife Management 38(4):903-909. 1975. (091

* GREEN JUNIOR, V. E. Birds injurious to the world rice crop: species, damage and control. 1-3. Western Hemisphere. Riso 21(3):281-292. 1972; 22(1): 59-68. 1973; 22(3):257-268. 1973. (092

* _____. Control de los pájaros dañinos en los cultivos tropicales. Hacienda 67(5):15-22. 1972. (093

Now that weeds and pests can be controlled by chemical means, the damage caused by birds far exceeds their beneficial effects. Several species of birds inflicting severe damage in the Americas are described; the emphasis is on species noxious to tropical and subtropical crops. The *Quelea* problem in Africa is mentioned as well. Migratory birds are often harmless during part of their life, but descend in huge flocks on cropped fields during the migratory phase. Bird control methods are briefly discussed in a general way. (Tropical Abstracts 28:w23)

GRIFFINGS, J. P. y DAVIS, C. A. Mourning dove foods in an uncultivated area of New Mexico. Journal of Wildlife Management 38(2):375-376. 1974. (094

GRIFFINGS, J. P. y DAVIS, C. A. Feeding diversity and specific search image of mourning doves in southern New Mexico. Southwest Nature 23(4):702-704. 1978. (095

GRIMSHAW, D. Understanding the biology of birds offers best hope for damage control. Hortic. Ind. 1976:141-143, 152. 1976. (096

GUARINO, J. L. Methiocarb; a chemical bird repellent. Proceedings of the Vertebrate Pest Conference, no. 5:108-111. 1972. (097

_____., SHAKE, W. F. y SCHAFFER JUNIOR, E. W. Reducing bird damage to ripening cherries with methiocarb. Journal of Wildlife Management 38(2):338-342. 1974. (098

GUYNN, D. E. y SCANLON, P. F. Crop milk production activity in mourning doves during the hunting season in Virginia. Virginia Journal of Science 24(3): 124. 1973. (099

HAAS, G. H. Unretrieved shooting loss of mourning doves in North Central South Carolina. Wildlife Society Bulletin 5(3):123-125. 1977. (100

HANSON, H. C. y KOSSACK, C. W. Methods and criteria for aging incubated eggs and nestlings of the mourning dove. Wilson Bulletin 69(1):91-101. 1957. (101

_____. y KOSSACK, C. W. Weight and body-fat relationship of mourning doves in Illinois. Journal of Wildlife Management 21:169-181. 1957. (102

HARRIS, S. W. Migrational homing in mourning doves. Journal of Wildlife Management 25:61-65. 1961. (103

_____., MORSE, M. A. y LONGLEY, W. H. Nesting and production of the mourning dove in Minnesota. American Midland Nature 69:150-172. 1963. (104

HAWKINS, T. H. Wood pigeons in Britain. Biol. Hum. Affairs 17(4):189-192. 1952. (105

HAYLOCK, J. W., DISNEY, H. J. de S. y RAPLEY, R. E. Control of the Sudan Dioch or Red-billed Finch in Tanganyika. East African Agricultural Journal 21: 210-217. 1954. (106

_____. Investigations on the habits of Quelea birds and their control. Nairobi, Government Printers, 1959. 16 p. (107

* HEICHEL, G. H. y WASHKO, W. W. Bird damage to Connecticut corn. Connecticut Agricultural Experiment Station. Bulletin no. 761. 1976. 8 p. (108

HENDERSON, F. R., BOGGESS, E. K. y FRETWELL, S. D. Pest bird management. Kansas State University. Cooperative Extension Service, no. 585. 1978. 24 p. (109

HENRY, J. y BROWN, R. R. 'Bobwhite' is for the birds. A wildlife soybean provides a feast for birds, large and small. Soil Conservation 44(11):8-9. 1979. (110

* HERMANN, G. y KOLBE, W. Effect of seed coating with Mesurol for protection of seed and sprouting maize against bird damage, with consideration to varietal tolerance and side-effects. Pflanzenschutz-Nächrichten "Bayer" 24:279-320. 1971/1972. (111

It is clearly evident from the presented review of the literature that prevention of bird damage at emergence is extremely important in maize growing. Maize is a crop which requires wide plant spacing, especially when it is grown for grain production, and as it is drilled to a stand the rate of seeding is low so that consequently the risk of yield losses from birds and other pests is very high. A detailed report is presented of tests and field treatments with Mesurol (common name of active ingredient: mercaptodimethur) applied as a maize seed coating for bird repellency. Results obtained since 1964 both in Europe and in the maize-growing areas of North America are of a most positive nature. It is evident from all the recorded results that by coating maize seed with Mesurol satisfactory repellency to the most important depredating bird species, especially pheasants, has been obtained for the first time. The repellent effect of Mesurol which has now been in use on a progressively increasing scale for many years, is manifested by the behavioural reaction of the different depredating bird species, namely that they completely avoid treated maize fields. The mechanism of action of a bird-repelling seed treatment is explained ethologically. Full consideration must be given to this mechanism of action in the testing of bird repellents, and the basic factors that must, therefore, be observed as well as the essential requirements that have to be met for such tests to be successful are described. Results obtained to date show that provided the coating and sowing operations are properly performed, the Mesurol treatment is satisfactorily tolerated by the principal maize varieties grown for grain production, silage and green feeding. The side-effects of the Mesurol seed coating treatment comprise marked reduction of frit fly infestation and repellency to mammals that cause crop damage, viz. wild boar, hares, rabbits and mice. Furthermore, Mesurol has been successfully used as an insecticidal coating on graded sugar beet, fodder beet, mangel and brassica seed for the control of pests

attacking these crops at emergence. Residue studies have shown that treated crops are free of residues at harvest so that the toxicological and hygienic requirements for safe use of Mesurol in maize production are also satisfied. The repellent action of Mesurol should be supported by employment of expedient crop growing techniques, use of good quality seed, careful selection of varieties taking into consideration the purpose for which they are to be grown as well as the FAO index, and also by the adoption of all other measures necessary for maintaining the desired plant population (such as chemical weed control and other crop protection measures).

HOSHINO, T., UJIHARA, K. y SHIKATA, S. Bird damage and resistance in grain sorghum. Bulletin of the Chugoku National Agricultural Experiment Station, A 26:25-41. 1979. (112

HOYOUX, J. M. A propos de quelques methodes de lutte contre les depredateurs aviaires. Fruit Belge 47(387):251-262. 1979. (113

HUANG, Y. R. Studies on bird damage to paddy rice and its control. Journal of Agriculture and Forestry 57(2):51-68. 1974. (114

* HUNTER, F. A. Preliminary practical assessments of some bird scaring methods against wood-pigeons. Annals of Applied Biology 76(3):351-353. 1974. (115

A wealth of evidence now exists to demonstrate clearly that methods currently available for killing wood-pigeons (*Columba palumbus* L.) in the country are not efficient enough to secure a significant or lasting reduction in numbers over a large area and that eradication is at present out of the question. Bird scaring equipment can be conveniently classified according to the sensory system through which, it is hoped, it will affect birds, as follows: audible scarers such as klaxon horns, gas cannons and other 'bangers', broadcasts of prerecorded distress calls and broadcasts of electronically synthesized sound; visible scarers including plastic streamers, flashing lights, coloured balloons, stuffed owls and dummy sparrowhawks, scarecrows and model pigeons; tactile repellents which include the jelly-like substances spread on the ledges of buildings to prevent pigeons or starlings from perching; taste/smell repellents include relatively non-toxic chemicals such as anthraquinone, alum, and thiram but some toxic sprays with constituents such as endrin have been used in some countries. The deliberate poisoning of birds is, of course, illegal in Britain.

IHERING, R. VON. La paloma *Zenaida auriculata* en el nordeste del Brasil. Hornero (Argentina) 6:37-47. 1935. (116

INFORZATO DE LIMA, M. A. y SILVA SASSO, W. DA. Poly saccharides in the crop of *Columba livia*. Annales d'Histochimie 21(4):365-370. 1977. (117

_____. Lipid droplets in the lining epithelium of the crop of *Columba livia*. Acta Anatomica 101(2):153-159. 1978. (118

IRBY, H. D. y BLANKENSHIP, L. H. Breeding behavior of immature mourning doves. Journal of Wildlife Management 30:598-603. 1966. (119

* ISMAIL, A. A., SCHEMNITZ, S. D. y GRAMLICH, F. J. Bird damage to blueberry fields in Maine. Research in the Life Sciences 21(12):1-13. 1974. (120

A cooperative study conducted by the University of Maine and the U.S. Bureau of Sport Fisheries and Wildlife was initiated to determine the extent of bird depredation on Maine lowbush blueberries. Its objectives were: to survey blueberry growers' opinion relative to the extent of bird damage in their fields and to assess berry loss to birds and bird activity in a field study. Three hundred and forty-four Maine lowbush blueberry growers participated in a survey to assess bird depredation on blueberry fields. Bird damage was considered to be a problem that has increased during the past five years. Most of the growers do not use bird control methods. Growers in mid-coastal and western Maine believe that the bird problem is more extensive in their fields than growers from eastern Maine, namely, Washington County. Loss in blueberry fields due to bird depredation is believed to be greater than damage caused by other forms of wildlife. A field study showed that bird depredation was not a cause of economic loss to the blueberry industry in Washington County during the 1973 season. Observations in this country revealed large numbers of flocking and general increase in bird activity in blueberry fields after the harvest period. More bird activity was observed in small fields in central, southern and western Maine than in Washington County. In small fields surrounded by woods, the chance of significant damage is increased, especially along the edges of the fields where protective cover is available.

JACKSON, J. J. Nesting success of *Quelea quelea* with 1 parent removed and observations on roosting behavior with implications for control. Proceedings of the Vertebrate Pest Conference, no. 6:242-245. 1974. (121

_____. The relationship of *Quelea* migrations to cereal crop damage in the Lake Chad basin. Proceedings of the Vertebrate Pest Conference, no. 6: 238-242. 1974. (122

JACKSON, W. B. y JACKSON, S. S. Estimates of bird depredations to agricultural crops and stored products. Plant Health Newsletter Publication, B 84:33-43D. 1978. (123

_____. Rid-a-bird perches to control bird damage (house sparrows, starlings, and pigeons, endrin, fenthion). Proceedings of the Vertebrate Pest Conference, no. 8:47-50. 1978. (124

JAEGER, M. M. y ERICKSON, W. A. Levels of bird damage to sorghum in the Awash Basin of Ethiopia and the effects of the control of *Quelea quelea-quelea* nesting colonies 1976-1979. Proceedings of the Vertebrate Pest Conference, no. 9:21-28. 1980. (125

JAIN, M. B. y PRAKASH, I. Bird damage in relation to varietal differences in Bajra crop. Annals of Arid Zone 13(2):139-144. 1974. (126

An indirect method of assessing damages to standing crop of millet, *Pennisetum glaucum*, due to incidence of birds is presented. It was estimated that from maturity till harvest of the crop about 10% of the bajra or millet grains of the standing crop was lost due to damage by birds. Hybrid bajra suffered more (144.03 ± 2.60 kg/ha) losses than the RSK variety (80.20 ± 21.35 kg/ha). (Abstracts on Tropical Agriculture 1:7502041)

* JONES, B. E. Factors influencing wood-pigeon (*Columba palumbus*) damage to brassica crops in the Vale of Evesham. Annals of Applied Biology 76(3):345-350. 1974. (127

Over a number of years, vegetable growers with holdings in the Vale of Evesham (Avon Valley to the north of the Cotswolds and to the east of Worcester) have made complaints of serious winter damage by wood-pigeons to Brussels sprouts and spring cabbage, and, as a result of these complaints, a study of the problem was started in the autumn of 1968. A description of study areas, protective measures undertaken and results are given.

JONES, E. L. The bird pests of British agriculture in recent centuries. Agricultural History Review 20(2):107-125. 1972. (128

JONES, P. J. y WARD, P. The level of reserve protein as the proximate factor controlling the timing of breeding and clutch-size in the Red-billed Quelea (*Quelea quelea*). IBIS 118:547-574. 1976. (129

_____. The utilization of calcareous grit by laying *Quelea quelea*. IBIS 118(4):575-576. 1976. (130

JONES, W. R. The monk parakeet, a new vertebrate agricultural pest. Minutes of the Annual Meeting of the National Plant Board, no. 47:38-43. 1973. (131

JUBB JUNIOR, G. L. y CUNNINGHAM JUNIOR, H. N. Birds associated with grapes in Erie County. American Journal of Enology and Viticulture 27(4):161-162. 1976. (132

* KAPLAND, J., LENORMAND, C. y COMBA, D. La protection des régimes de dattier contre les attaques aviaires. Fruits 27(6):439-444. 1972. (133

En Assaba y en la Estación de Kankossa una gran parte de la cosecha de dátiles desaparece consumida por los pájaros: *Psitacula krimeri, Lamprocolius chalybeus, Lamprotornis caudatus*. Se han previsto diferentes medios de protección: auditivos, químicos y físicos. Los mejores resultados han sido obtenidos protegiendo los racimos con sacos plásticos de colores diferentes. El color rojo parece tener al mismo tiempo una acción de espantapájaros. El valor de la cosecha salvada de esta forma en relación al precio de los sacos de plástico juega en favor de una tal protección.

* KENWARD, R. E. y SIBLY, R. M. A wood-pigeon (*Columba palumbus*) feeding preference explained by a digestive bottle-neck. Journal of Applied Ecology 14(3):815-826. 1977. (134

Woodpigeons foraging at brassica sites spent around 50% of their time resting. They tended to move from brassica to clover sites during the day. A higher proportion of birds was found at brassica after cold nights and spells of cold weather. Feeding at brassicas was associated with low body weight, and juveniles which had made least progress with their post-fledging moult tended to accumulate there. These observations can be interpreted differently according to whether or not there is a bottle-neck in the digestion of brassicas. A laboratory experiment favours the bottle-neck hypothesis. The limiting digestion rate (0.5 g per minute) is estimated to be insufficient for wild woodpigeons subsisting on brassica to maintain weight in mid-winter.

* _____. Hawks and doves: factors affecting success and selection in goshawk attacks on woodpigeons. Journal of Animal Ecology 47(2):449-460. 1978. (135

A trained male goshawk was used to arrange attacks on single pigeons and flocks, at brassica feeding sites and elsewhere. Captured pigeons were compared with short samples from the same sites, using dry weight of the *pectoralis minor* muscle as an index of condition. Attacks on pigeon flocks at brassica sites were more

successful than when the birds were feeding on grasslands and stubbles, possibly because of variation in pigeon condition. Attacks were more successful in the hour before sunset than in the four previous hours. Pre-roost crop filling may have made the pigeons more vulnerable in the last hour, and the hawk might have been trying harder to obtain food as dusk approached. Attacks on single pigeons, and on birds in small flocks, were more successful than those on flocks of more than ten pigeons. This occurred partly because single birds were in poor condition and partly because the hawk achieved less surprise as flock size increased. The hawk may also have been: (a) less likely to encounter weak pigeons; (b) more confused, and (c) 'less confident' in attacks on large flocks than on small ones. Unless the hawk surprised pigeons feeding in flocks it was usually outflown. Pigeons captured from flocks which did not fly until the hawk reached them were in relatively good condition, but selection for poor condition became more marked if the birds took off when the hawk was further away and it had to chase them. The predation was selective, partly because single pigeons tended to be both worse in quality and more vulnerable to attack than birds in flocks, and partly because pigeons captured from flocks were below average in condition when the hawk did not achieve complete surprise. There were selection for diseased and defective pigeons, but not for those of one particular age or sex. Goshawk predation could also select for behaviour which delays crop filling until as late in the day as possible, and for flocking.

* KENWARD, R. E. The influence of human and goshawk *Accipiter gentilis* activity on wood-pigeons *Columba palumbus* at brassica feeding sites. Annals of Applied Biology 89(2):277-286. 1978. (136

Humans caused more than half the disturbance of wood-pigeons, *Columba palumbus*, from roadside brassica feeding sites. The birds always flew away from pedestrians, cyclists and horsemen, but often remained feeding when closed vehicles passed. The pigeons resettled immediately on the same feeding site after 23% of goshawk, *Accipiter gentilis*, attacks, and birds were feeding there later the same day after nearly half the attacks. They resettled immediately after a similar proportion (19%) of the times they were approached by humans on foot, and rarely fed in fields where people were working. The shorter the time pigeons had spent feeding before an interruption, the sooner they returned after it. This probably reflected the level of their crop food reserves. This behaviour should minimise the effect of short duration disturbance, as caused by goshawk attacks, on wood-pigeons feeding at brassica sites. Goshawk attacks did not cause a reduction in pigeon pecking-rate. Pigeons feeding in roadside fields tended to avoid the side nearest to the road, but not parts of fields adjoining walls and hedges which could have provided cover for predatory attacks. It is concluded that scaring techniques based on man himself are more promising than use of the goshawk in protecting crops against wood-pigeons.

* KUMAR, R. y SINGH, O. P. Role of the common blue rock-pigeon in the control of weeds of major crops in Meerut District of Uttar Pradesh, India. Indian Journal of Agricultural Sciences 48(11):679-681. 1978. (137

Under controlled conditions, the common blue rock-pigeon (*Columba livia intermedia* Strick.) was found to feed on six common winter weeds /*Chenopodium album* Linn., *Meliolotus indica* All., *Asphodelus tenuifolius* Cav., *Lathyrus sativus* Linn., *Sorghum halepense* (Linn.) Pers. and *Amaranthus viridis* Linn./ of major crops of Meerut district. An adult bird consumed 12.740 g of seed of *Asphodelus tenuifolius* or 4.470 g of the seed of *Lathyrus sativus*.

LA GRANGE, M. Quelea in Rhodesia: crop damage biology, and new control methods. The Rhodesia Science News 12(2):56-57. 1978. (138

LAVIE, B., OFER, I. y TIFERETH, M. Mesorol--for reducing bird damage to cherry and peach fruit. Hassadeh 58(7):1317-1319. 1978. (139

* LAWSON, H. M. Feral pigeon damage to field beans. Annals of Applied Biology 92(1):153-157. 1979. (140

Feral pigeon (*Columba livia*) feeding behaviour and its effect on crop growth and yield of field bean (*Vicia faba*) sown at three depths is described. By digging up seeds and destroying seedlings, pigeons reduced plant populations by over 95% on plots sown at 1.6 cm depth and by over 50% on plots with seeds at 2.2 cm in comparison with plant populations on plots sown at 2.9 cm. The pigeons returned at harvest time and caused varying levels of crop loss depending on plant density and especially on the degree of lodging of the crop. The results are used to illustrate the need to consider potential bird damage as a factor when changes in husbandry systems are being developed.

LEASH, A. M. *et al.* An analysis of the crop contents of White Carneaux pigeons (*Columba livia*), days one through twenty-seven. Laboratory Animal Science 21(1):86-90. 1971. (141

LENNERSTEDT, I. Seasonal variation in foot papillae of wood pigeon pheasant and house sparrow. Comparative Biochemistry and Physiology, A 51(3): 511-520. 1975. (142

LINDQUIST, L. The economic implications of bird damage to grapes. Wines and Vines 58(2):43-45. 1977. (143

LOGDSON, G. How to keep varmints out of your garden. Organic Gardening 26(9): 48, 50-52, 54. 1979. (144

LONDOÑO V., D. *et al.* Informe preliminar sobre la incidencia de torcaza naguiblanca (*Zenaida auriculata*) y su relación con problemas de daño a algunos cultivos en el valle del Cauca, Colombia. Bogotá, Instituto Colombiano Agropecuario, 1972. 11 p. (145

* LOURENS, D. C. Operation "finches". Farming in South Africa 34(4):34, 35, 39, 41. 1958. (146

McCLURE, H. E. Ecology and management of the mourning dove (*Zenaida macroura*) in Cass County, Iowa. Iowa State College. Agricultural Experiment Station. Research Bulletin, no. 310:359-416. 1943. (147

* McMILLIAM, W. W. *et al.* Bird resistance in diverse germplasm of sorghum. Agronomy Journal 64(6):821-822. 1972. (148

This study was conducted to examine the relative amount of bird resistance present in a broad spectrum of available sorghum /*Sorghum bicolor* (L.) Moench/ since bird resistance is highly desirable for inclusion into plant breeding programs. Ratings were taken on damage inflicted by natural populations of birds and on several plant characters, including tannin content of the seed, color of the seed, and plant height. The bird damage done to 142 domestic and exotic lines of sorghum revealed the presence of germplasm imparting resistance to birds: SPI 35038 had a low damage rating (2.5); lines SA 370 and Colby had a high damage rating (9.0). Some commercially available sorghum hybrids also appeared to have resistance. The amount of tannin in the sorghum seed was negatively associated with bird damage, as were seed color and plant height, although to a lesser extent. The amount of tannin and seed color showed a positive correlation. Nevertheless, several sorghum lines appeared to be resistant that contained a relatively low amount of tannin.

MADRIGAL C., A. Reconocimiento preliminar de aves predatoras en plantaciones de ciprés y estudio de sus contenidos estomacales. Medellín, Colombia, 1975. 81 p. (149

MAGOR, J. I. y WARD, P. Illustrated descriptions, distribution maps and bibliography of the species of *Quelea* (weaver-birds: Ploceidae). Tropical Pest Bulletin, no. 1:1-23. 1972. (150

* MALLAMAIRE, L. La lutte contre les oiseaux granivores en Afrique Occidentale (Mauritanie, Sénégal, Soudan, Niger). Journal d'Agriculture Tropicale et de Botanique Appliquee 8(4-5):141-179; 8(6-7):248-265. 1961. (151

MANIKOWSKI, S. y CAMARA-SMEETS, M. DA. Estimating bird damage to sorghum and millet in Chad. Journal of Wildlife Management 43(2):540-544. 1979. (152

MANIKOWSKI, S. y CAMARA-SMEETS, M. DA. Food preferences of the red-billed *Quelea quelea-quelea*. Terre Vie 33(4):611-622. 1980. (153

MARCH, G. L. *et al*. Diurnal variation in circulating levels of free fatty-acids and growth hormone during crop gland activity in the pigeon *Columba livia*. Comparative Biochemistry and Physiology, B 59(2):143-146. 1978. (154

MARTINEZ, O. E. Aves dañinas a la agricultura en el Uruguay. Revista de la Asociación de Ingenieros Agrónomos del Uruguay, no. 4:26-34. 1975; no. 5:14-21. 1976; no. 6:25-32. 1976; no. 7:35-38. 1976; no. 8:30-39. 1976. (155

MATHEW, G. A sporadic bird pest, *Ploceus philippinus* (Linnaeus) attacking paddy plants at Mannuthy Kerala. Agricultural Research Journal 15(1):96. 1977. (156

MEYLAN, A. Granivorous birds in sunflower crops. Proceedings of the Vertebrate Pest Conference, no. 8:73-77. 1978. (157

MIRARCHI, R. E. y SCANLON, P. F. Crop gland and gonadal activity in mourning doves killed during Virginia (USA) hunting season. Virginia Journal of Science 27(2):47. 1976. (158

_____. y SCANLON, P. F. Regression equations useful in reproduction studies conducted on mourning doves, *Zenaida macroura*. Virginia Journal of Science 29(2):66. 1978. (159

_____. y SCANLON, P. F. Reproductive characteristics of mourning doves, *Zenaida macroura* killed during the 1975 and 1976 hunting seasons. Virginia Journal of Science 29(2):66. 1978. (160

_____. y SCANLON, P. F. Duration of mourning dove, *Zenaida macroura*. Journal of Wildlife Management 44(1):209-213. 1980. (161

MITTERLING, L. A. Bird damage in the Connecticut fruit industry. Connecticut Pomol. Soc. Proceeding, no. 78:13, 15-17. 1969. (162

MONK, H. C. Nesting of the mourning dove at Nashville. Migrant 20:1-9. 1949. (163

MOREL, G. L'impact écologique de *Quelea quelea* (L.) sur les savanes sahéliennes; raisons du pullulement de ce plocéidé. Terre Vie 115:69-98. 1968. (164

MOREL, G. J. y MOREL, M.-Y. Comparison data between *Quelea quelea-quelea* and *Passer luteus* in the tropical savannas of West Africa. Cahiers Orstom, Serie Biologie 13(4):347-358. 1978. (165

MOTT, D. F. *et al.* Bird damage to peanuts and methods for alleviating the problem. Proceedings of the Vertebrate Pest Conference, no. 5:118-120. 1972. (166

_____. y STONE, C. P. Bird damage to blueberries in the United States. Washington, U.S. Bureau of Sport and Fish Wildlife. Special Science Report, no. 172. 1973. 15 p. (167

_____. Monk parakeet damage to crops in Uruguay and its control. In Bird Control Seminar, 6th, Bowling Green, Ohio, 1973. Proceedings. pp. 79-81. (168

MOULTON, D. W. Evaluation of methiocarb for repelling blackbirds from cultivated wild rice. Journal of Wildlife Management 43(3):747-751. 1979. (169

MURTON, R. K. The breeding of woodpigeons populations. Bird Study 5:157-183. 1958. (170

* _____. e ISAACSON, A. J. The functional basis of some behaviour in the woodpigeon *Columba palumbus*. IBIS 104:503-521. 1962. (171

_____. y VIZOSO, M. Dressed cereal seed as a hazard to wood-pigeons. Annals of Applied Biology 52:503-517. 1963. (172

The dynamics of a wood-pigeon population in Cambridgeshire are described and the potential risk of dressed grain considered in relation to the feeding behaviour of the birds and the use of the dressings seasonally and annually. Woodpigeons use autumn sowings as a source of food only in the absence of better grain supplies on stubbles; it is unusual for more than 50% of the population to feed on them, and the conditions leading to high exploitation of autumn sowings are discussed. In contrast, spring sowings coincide with a period of poor alternative food supplies and are fed upon by over 80% of the population. In the spring of 1961 about one-quarter of the acreage of cereals planted in the study area had been treated with aldrin or heptachlor insecticides and most of the remainder with γ-BHC or organomercury dressings. In autumn 1961 only 3.3% of the total acreage was treated with heptachlor and no aldrin or dieldrin was used, while in spring 1962 only γ-BHC or plain organo-mercury dressings were used. In 1961 there were no differences between the distribution of pigeons on fields containing grain treated with aldrin or heptachlor and that

on fields planted with BHC-treated grain; also there was no field evidence that pigeons found dressed grain unpalatable. Counts in 1962 showed no difference in the distribution of feeding wood-pigeons in fields containing cereals treated with plain organo-mercury dressings and in fields sown with grain treated with mercury plus γ-BHC. Many dead pigeons were found in the spring of 1961: population counts in one roost indicated that at least 8% of the birds had been killed. However, in the spring of 1962 wood-pigeon mortality was too low to measure. It is concluded that the voluntary agreement from January 1 1962, after which aldrin, dieldrin and heptachlor dressings were not to be used on spring-sown cereals, virtually abolished direct wood-pigeon mortality resulting from the consumption of treated grain. The general significance of such bird mortality on population size is briefly discussed.

MURTON, R. K., ISAACSON, A. J. y WESTWOOD, N. J. The feeding ecology of the woodpigeon. British Birds 56:345-375. 1963. (173

_____., ISAACSON, A. J. y WESTWOOD, N. J. The food and growth of nestling wood-pigeons in relation to the breeding season. Proceedings of the Zoological Society of London 141:747-782. 1963. (174

* _____., ISAACSON, A. J. y WESTWOOD, N. J. The use of baits treated with alpha-chloralose to catch wood-pigeons. Annals of Applied Biology 52: 271-293. 1963. (175

Wood-pigeons were induced to take wheat, barley, oats, peas and beans when these were spread on fields where the birds were feeding. When these foods were scattered on pastures in winter (January-March) they were taken in preference to the pigeons' normal food of clover. These results are discussed in relation to food preferences and the role of a "search image" in the feeding behaviour of the species. Cereal and pea baits containing 1.5% by weight of α-chloralose were laid on a variety of feeding grounds used by wood-pigeons during the periods 27 October 1959 to 21 March 1960 and 4 November 1960 to 18 June 1961. In a total of thirty-four such trials 1408 birds were narcotized. Of these 57% were wood-pigeons and 20% were legally protected or game species. Using cereal baits the risk to species other than wood-pigeons was lowest on pasture, where 74% of the birds caught were wood-pigeons, 5% were game species and less than 1% were protected birds. Of the narcotized wood-pigeons, 81% recovered unharmed, and partridges and pheasants had similar recovery rates. Only 38% of the stock-doves recovered and the small finches (including house and tree sparrows) also had a low recovery rate of less than 50%. Baits normally disappeared with about 1 week. In a few cases they persisted for longer periods, the maximum being 31 days. Uneaten baits were lost through

settlement in the soil, germination and ploughing operations. Birds were captured throughout the whole period during which bait was available. Three trials using peas treated with 1.5% by weight of α-chloralose were conducted between 7 November 1961 to 22 January 1962. Thirty-nine wood-pigeons and thirty-one game birds were narcotized and captured but no small protected birds were affected. The recovery rates of the captured birds were similar to those narcotized by using cereal baits. The method is much cheaper than control by sooting or nest destruction. The method of using stupefying baits is potentially a valuable means of wood-pigeon control but further field tests are necessary. Only baits such as peas and beans are at present suitable as these appear to be too large to be eaten by the small protected species.

MURTON, R. K., WESTWOOD, N. J. e ISAACSON, A. J. The feeding habits of the wood-pigeon *Columba palumbus*, Stock Dove *C. oenas* and turtle dove *Streptopelia turtur*. IBIS 106:174-188. 1964. (176

_____., WESTWOOD, N. J. e ISAACSON, A. J. A preliminary investigation of the factors regulating population size in the woodpigeon *Columbus palumbus*. IBIS 106:482-507. 1964. (177

_____. e ISAACSON, A. J. Productivity and egg predation in the wood-pigeon. Ardea 52:30-47. 1964. (178

* _____. Natural and artificial population control in the wood-pigeon. Annals of Applied Biology 55:177-192. 1965. (179

* _____., ISAACSON, A. J. y WESTWOOD, N. J. The relationships between wood-pigeons and their clover food supply and the mechanism of population control. Journal of Applied Ecology 3:55-96. 1966. (180

This paper describes the relationships between a wood-pigeon population and its clover food supply over six winters (November to March) in a study area of 2647 ac of arable farmland in Cambridgeshire. Wood-pigeons were counted during standard census walks; some shot birds and others caught with stupefying baits were weighed, aged and examined; feeding birds were observed for long periods and their behaviour recorded. The clover availability was measured by counting the number of leaves in sample foot squares throughout the area. The number of leaves eaten was recorded under some conditions and in addition protective exclosures were erected to prevent the birds from feeding on control plants. Wood-pigeons regularly ate over 50% of the clover stocks in mid-winter but damaged crops recovered in early spring when clover growth was rapid and usually there was no difference between control plots (where no clover was eaten) and damaged areas by May. The clover was able to recover in two months when 89% was artificially destroyed by cutting to simulate very intensive

damage. In 1961-62 the percentage decrease in clover density on different fields between November and late January/early February was unrelated to original density when stocks had been above about 150 leaves/ft$^2$, but proportionately more survived when initial densities were below this value. The reasons are given for attributing this to an absence of pigeons feeding at low clover densities; differential growth, weather damage or farm stock grazing could not account for the result. In 1962-63, when pigeons were unable to feed owing to a persistent snow blanket, clover changes caused by growth and weathering were density-independent for all clover densities. More leaves could be identified as eaten by pigeons at high clover densities, but not proportionately more. Wood-pigeons were sometimes noticeably distributed according to clover density. Sometimes they clearly avoided fields with little clover (fields with less than 100 leaves/ft$^2$) and this was particularly so in January, but later in the season in February flocks were found on areas of poor clover stock. There was some evidence that more mortality occured in the flocks inhabiting poor fields (including emigration as mortality) because in one year (1964) bird density remained stable at high but declined at low clover densities. Some other observations showed that the mean weight of pigeons in those flocks feeding at very low clover densities was significantly lower than that of birds in flocks feeding on good fields. In 1965 pigeon density declined on both good and bad fields, though it seems likely that this was because the original total population was much higher than in 1964. Wood-pigeons fed gregariously and less than 1% fed in groups smaller than five individuals. The gregarious habit is shown to be very ingrained. The feeding rate varied throughout the flock and birds in the middle and rear obtained significantly more food items per unit time than those in the front. Some preliminary evidence is given to show that pigeons have a stable flock structure, so that on average each bird maintains the same position relative to others. It is not known whether a true social hierarchy exists, with the birds able to recognize each other as individuals. Front birds obtained significantly less food than the others over long periods. The food collection rate (number of pecks per minute) did not seem to vary with clover density throughout a wide range of values, partly because the birds increased their searching rate (number of paces per minute) to compensate. However, at densities below 100 leaves/ft$^2$ the pecking rate did decline with clover density. When the feeding rate fell below an optimum level for satisfactory food intake the front birds were affected first. Some birds were seen to be collecting insufficient food. With a constant food density the rate of intake decreased with an increase in searching rate. Because the searching rate declined in the late afternoon, to enable the intake rate to increase, it seems likely that the birds were more selective in what they consumed in the first part of the day. Most of the birds in the population remained in good condition, judged by their body weights, irrespective of the total food supply, but the proportion in very low weight classes varied,

not with the food supply, but in relation to the mortality rate that was governed by the food supply and population size. Hence, proportionately more starving birds were seen when the winter mortality rate was high. Because differential mortality through starvation or enforced emigration occurred the total population size was positively correlated with clover availability in five years of study. In one year continuous and steady competition in the flock was disturbed because heavy and persistent snowfalls forced a high population into sudden and intensive conflict for a very limited *Brassica* food alternative. Instead of a few starving birds being found nearly the whole population suffered a reduction in body weight at the same time. Juveniles suffered more severly than the adults from food shortages but there were no differences between the sexes. The relationships between food collection rates and searching area are discussed in connection with flock behaviour and a mechanism for competition is demonstrated. Pigeons leaving the feeding flocks departed mainly from the front. Similarly, birds arriving at the flock settled in the front or rear and very rarely in the center. It is suggested that a kind of 'social herarchy' was responsible for this behaviour and that submissive individuals avoided intra-specific conflict situations. It is suggested that if flock size is too high relative to food availability some birds have feeding rates below an optimum threshold and under these conditions they leave the flock to forage elsewhere. In practice they would try to feed with other flocks. In this way the flocks could become adjusted to the food supply and some flocks would be forced to use areas of poor clover availability, whence mortality could occur but normally only a few individuals would die at a time. It is contended that social factors can be involved in ensuring competition and the highest survival rate relative to food supplies. However, this mechanism of population control could have become adapted to a social behaviour that evolved for other reasons. The possibility that group-selection was involved and prevented birds from 'free-lancing' is discarded; partly because an adequate genetical basis for the theory is lacking, and partly because it seems possible that the advantages of gregarious behaviour for population control are a secondary benefit of a behaviour maintained through other survival advantages.

MURTON, R. K. The significance of a specific search image in the feeding behaviour of the wood-pigeon. Behaviour 40:10-42. 1971. (181

_____., ISAACSON, A. J. y WESTWOOD, N. J. The significance of gregarious feeding behaviour and adrenal stress in a population of wood-pigeons *Columba palumbus*. Journal of Zoology 165:53-84. 1971. (182

* _____. y JONES, B. E. The ecology and economics of damage to Brassicae by wood-pigeons, *Columba palumbus*. Annals of Applied Biology 75(1):107-122. 1973. (183

Damage caused by wood-pigeons, *Columba palumbus*, to spring cabbage and Brussels sprouts was measured during three winters

in two areas in the Vale of Evesham, Worcestershire. In one area (experimental) special attempts were made to reduce pigeon damage in addition to the normal efforts of the growers. In the other (control) area no such additional measures were taken. There was slightly more damage in 1969-70, but low market prices made it less important than in 1968-69 or 1970-71. There was no significant difference in any season between the damage in the control and experimental areas. No damage was caused to Brussels-sprouts buttons as the birds ate only the tops of the plants; they preferred Brussels sprouts to cabbages and it is likely that the presence of the former helped to reduce the amount of damage to nearby cabbage fields. The amount of damage was not correlated with the grower's estimates in the control area. In the second season a very intensive shooting campaign in the experimental area did not result in less damage, but the movements of local inhabitants and farm workers near a village did afford protection. The significance of the damage in the Vale and elsewhere is assessed in relation to the economics of crop production, the cropping pattern for cabbages and the behaviour and ecology of the wood-pigeon.

* MURTON, R. K. *et al.* The ecology of the eared dove (*Zenaida auriculata*) in Argentina. Condor 76(1):80-88. 1974. (184

The ecology of the eared dove was studied near Córdoba, Argentina, in an area of arable cultivation interspersed with secondary thornscrub. Analysis of crop contents revealed that the bird's main diet by weight was composed of cultivated seeds (85%), particularly sorghum, wheat, and millet. Their feeding habits made the birds pests of the farmer. "Natural" foods were grass and wild seeds, with *Chenopodium*, *Amaranthus*, *Echinochloa*, and *Setaria* spp. being important constituents of the diet. The food of nestlings was similar. In uncultivated areas the breeding season began variably between October and February and extended until April, thereby coinciding with and following the summer rains. Arable farming has enabled the breeding season to begin in August or September so that reproduction occurs during about 10 months. Seasonal changes in gonad size and histology are described. The molt takes 10 months, generally starting in October and ending in July, so that one pair of primaries is changed per month. But there is variability in the population and some individuals do not begin molting until April. Of the eggs laid, 45% give rise to fledged young, while from 52% of the clutches laid at least one chick is reared. Some causes of failure are mentioned. The discussion briefly compares the feeding and breeding ecology of the mourning dove in the southern United States and mentions the differing economic status of these two allopatric species that are obviously geographical representatives of a common ancestral stock.

MURTON, R. K., WESTWOOD, N. J. e ISAACSON, A. J. Factors affecting egg weight, body weight and moult of the wood pigeon (*Columba palumbus*). IBIS 116(1): 52-73. 1974. (185

* _____., WESTWOOD, N. J. e ISAACSON, A. J. A study of wood-pigeon shooting: the exploitation of a natural animal population. Journal of Applied Ecology 11(1):61-81. 1974. (186

A wood-pigeon (*Columba palumbus*) population and its clover and grain food supply was censused from 1958 until 1970. During the first six years, winter battue shoots were held between late January until early March and large numbers of birds were killed as they returned to roost. No shooting occurred during the next three years and then an intensive experimental programme of decoy shooting by one man was monitored throughout the last three years. Shooting did not increase the total amount of winter mortality above the level experienced in the absence of shooting. The number of wood-pigeons in autumn and winter was determined by the amount of grain on cereal stubbles, or clover on leys and pastures, respectively, and immigrants moved in to take advantage of any unexploited food resource. There was no increase in pigeon numbers following abolition of battue shoots in 1965. Ringing records show that a higher proportion of recovered pigeons were found dead instead of being shot, suggesting that birds which previously were shot before dying of food shortage now succumbed for natural causes. In 1968-69 the average cost in terms of man-hours and cartridges for an expert decoy gunner to kill one pigeon was £0.24. It cost £0.13 to kill a pigeon with stupefying baits (0.10 man-hours/bird instead of 0.23 man-hours for shooting). For shooting to affect population size, a cost of about £0.50/bird would probably be realistic, assuming sufficient guns were available. For a given number of dead pigeon-decoys the percentage of passing pigeons at risk which responded, decreased as flock size increased as did the percentage shot. Ignoring any scaring benefit, decoy shooting is most effective as a means of killing pigeons when single birds or small flocks are at risk. An increase in the number of dead pigeon decoys with closed wings, to about eighty or, with open wings to about forty, led to an increase in the percentage response from live birds and hence numbers shot, but with more decoys pigeons were repelled. Within the ranges defined (0-80 and 0-40) there was no difference in the effectiveness of dead pigeons with closed or open wings. It is estimated that 7% of live pigeons at risk are killed with five closed-wing decoys, 14% with twenty such decoys and 23% (the maximum) with eighty decoys. Artificial decoys were 13-46% less useful than dead pigeons depending on the number used.

* _____. Bird pests in England. Mitteilungen der Biologischen Bundesanstalt für Land-und Forstwirtschaft 165:212. 1975. (187

*Columba palumbus* was the major bird pest to the arable farmer and populations were high from the 1940's to the 1960's.

*Alauda arvensis* is also proving more troublesome especially in sugar beet. *Perdix perdix* has declined through causes associated with this same fundamental alteration in crop rotations. *Passer domesticus* appears to be causing more damage to ripening cereal crops than previously. *Pyrrhula pyrrula* continues to inflict much damage in orchards - notably by taking buds of pears and apples - and species of *Turdus*, as well as *Sturnus vulgaris* and *Passer domesticus* are a particular nuisance when soft fruits begin to ripen. In urban habitats *Columba livia* var. is the major bird pest, but complaints against *Streptopelia decaocto* are increasing; there is increased awareness of the risk of disease transmission by such species. There is a much wider appreciation of the need to understand the ecological context in which birds cause damage.

MURTON, R. K. y WESTWOOD, N. J. Birds as pests. Applied Biology 1:89-181. 1976. (188

MYLLYMAKI, A. y TENOVUO, R. Bird damage to cultivated fruit crops in Finland. EPPO 84:21-22. 1978. (189

NAUDE, T. J. The Quelea problem in southern Africa. Ostrich (Suppl.), no. 3: 264-270. 1959. (190

NEIDERMYER, W. J. y HICKEY, J. J. The monk parakeet in the USA, 1970-75. American Birds 31(3):273-278. 1977. (191

NOUVEL, M. La lutte contre les etourneaux. Une serie d'experimentations pour la recherches de voies nouvelles. Phytoma, no. 313:25-27. 1979. (192

OLSEN, A. M. Predator birds can benefit agriculture. South Australia Journal of Agriculture 74(2):46-49. 1970. (193

OREGON AGRICULTURAL EXPERIMENT STATION. Pheasant populations plummet. Food, cover predators keys to bird survival. Oregon Agricultural Program 25(1): 9-10. 1978. (194

PARK, P. O. Granivorous bird pests in Africa; towards integrated control. SPAN 17(3):126-128. 1974. (195

Integrated control of grain-eating birds, including *Quelea quelea*, *Ploceus cucullatus*, *Passer luteus*, and *Quelea erythrops* will not be easy. Haphazard attempts can only be partially successful and a full understanding of the ecology of the culprit species is essential. (Abstracts on Tropical Agriculture 1:7502326)

PERUMAL, R. S. Pest birds of grapevine (*Vitis vinifera* L.). Farm Facts 6(7): 27-28. 1972. (196

_____. Bird damage in sorghum crop. Farm Facts 7(3):41-42. 1973. (197

_____, SUBRAMANIAM, T. R. y DAVID, P. L. Studies on the birds visiting CSH-1 sorghum and the extent of bird-damage. Andhra Agricultural Journal 18(5): 205-208. 1973. (198

PIERCE, R. A. Bird problems in south central USA still unsolved. Proceedings of the Bird Control Seminar, no. 7:28-29. 1977. (199

* PINOWSKI, J. The problem of protecting crops against harmful birds in Poland. OEPP/EPPO Bulletin 3(1):107-110. 1973. (200

From the point of view of Polish agriculture, the rook (*Corvus frugilegus* L.) causes the most damage. Jackdaws (*C. monedula* L.) usually forage together with rooks and are equally abundant as a breeding species in the southern and central regions of Poland. Fields under spring oats, barley, wheat, maize, peas and winter wheat are the main feeding grounds of rooks and jackdaws. Unlike the corvine birds, starlings (*Sturnus vulgaris* L.) in Poland, only cause damage to cherry orchards, although in certain areas they also attack strawberries and currants. The house sparrows (*Passer domesticus* L.) cause considerable damage to ripening crops of wheat, barley and sunflowers. Domestic pigeons cause considerable damage to crops of peas, wheat and maize grown within a 50 km radius of a town.

_____. Granivorous birds: their role and control in ecosystems. International Studies on Sparrows 7(1):88-96. 1975. (201

_____. The black-faced dioch (*Quelea quelea* L.) threat to African agriculture. Kosmos, Series A, Biologia 25(2):13-135. 1976. (202

POPE, G. G. y WARD, P. The effects of small applications of an organophosphorus poison, fenthion on the weaver bird *Quelea quelea*. Pesticide Science 3:197-205. 1972. (203

* _____. e IRVING, N. S. The control of bird pests of cereals in Africa. Annals of Applied Biology 84(1):118-120. 1976. (204

Main emphasis is given on *Quelea quelea*, which is the most serious bird pest of small grain crops in Africa and the one that has received most attention from control organizations. Brief reference is made to some other granivorous birds which are now becoming more serious pests of grain. Control methods are also mentioned.

POPE, G. G. y JONES, P. J. *Quelea quelea* control. Plant Health Newsletter Publication, B 84:202-210. 1978. (205

POTVIN, N. y GENEST, J. A la recherche "d'epouvantails a moineaux". Bulletin Agricole 59:98, 103. 1976. (206

* _____., BERGERON, J.-M. y GENEST, J. Comparaison de méthodes de répression d'oiseaux s'attaquant au mais fourrager. Canadian Journal of Zoology 56(1): 40-47. 1978. (207

To reduce damage to corn fields by redwing blackbirds, grackles, cowbirds, and pigeons we tried four means of control: Avitrol 200, Methiocarb, acetylene canon, and Av-alarm. During sowing, all means of control were efficient to a certain extent. Damage was reduced by 28% with use of the acetylene canon and by 100% with the use of a combination of the canon and the Av-alarm. At the beginning of harvesting only Methiocarb was not effective. Other products reduced damage from 54 to 93%. Populations of redwing blackbirds and grackles comprised at least 3400 individuals by that time.

PREDATORY BIRDS in Britain. London, British Field Sports Society, s.f. 64 p. (208

QUAY, T. L. Mourning dove studies in North Carolina. Raleigh, North Carolina Wildlife Resources Commission, 1951. 90 p. (209

RAMAKKA, J. M. y RAMAKKA, V. F. Eared dove *Zenaida auriculata* food habits in southwestern Colombia. Journal of Wildlife Management 43(2):534-540. 1979. (210

RAMZAN, M. y TOOR, H. S. Damage to maize crop by rose-ringed parakeet *Psittacula krameri* in the Punjab. Journal of the Bombay Natural History Society 70(1): 201-204. 1974. (211

REPORT OF the Anti-Locust Research Centre for 1969. London, 1970. 49 p. (212

In 1969, the terms of reference of the Anti-Locust Research Centre were officially widened to include research on certain pests of agriculture overseas other than locust and grasshoppers, notably armyworms and weaver birds (*Quelea*), to which research and control techniques developed for work on locust are applicable, and a panel of consultants was set up to advise on programmes of research. This report records the work carried out in 1969 on locust and grasshoppers throughout the world and on the armyworm *Spodoptera exempta* (Wlk.) in Africa. The year was notable for a dramatic decline in numbers of *Schistocerca gregaria* (Forsk.) following the increase in 1968. (Review of Applied Entomology, A 58:2803)

RIZZO, H. F. Aves útiles y aves perjudiciales para la agricultura. 4a. ed. Buenos Aires, Hemisferio Sur, 1978. 58 p. (213

ROBARDS, G. E. y SAUNDERS, G. R. Tell us your stories about bird and animal pests. Agricultural Gazette of New South Wales 88(5):24-25. 1977. (214

ROBERSON, R. C. Potential bird pests of California fruit and grain crops. Pest. Contr. Oper. News 32(5):14-16. 1972. (215

ROSCOE, D. R. *et al.* Observations on the monk parakeet in New York State. New York Fish Game Journal 20(2):170-173. 1973. (216

ROWE, J. J. Prevention of damage by birds and mammals in forest nurseries. Quarterly Journal of Forestry 65(2):148-157. 1971. (217

ROY, J. Protection of cereal crops from the attacks of grain eating birds in dry African savannas. International Studies on Sparrows 7(1):26-36. 1975. (218

SADLER, K. C., TOMLINSON, R. E. y WIGHT, H. M. Progress of primary feather molt of adult mourning doves in Missouri. Journal of Wildlife Management 34:783-788. 1970. (219

SANDVIK, M. W. Three methods of battling the birds (blackbirds in North Dakota sunflower fields). The Sunflower 6(6):28-30. 1980. (220

SCHAFER JUNIOR, E. W. y MARKING, L. L. Long-term effects of 4-amino pyridine exposure to birds and fish. Journal of Wildlife Management 39(4):807-811. 1975. (221

_____. The need for practical and objective test protocols for bird damage control chemicals. Proceedings of the Bird Control Seminar, no. 7:247-249. 1977. (222

_____. Recent developments in bird damage control chemicals. Proceedings of the Vertebrate Pest Conference, no. 8:32-35. 1978. (223

* _____. Registered bird damage, chemical controls. Pest Control 47(6):36-39. 1979. (224

This report lists 67 bird damage control products which are currently known to have Federal or State registrations, and the manufacturers which are holders of these registrations. This updated list would prove useful to Federal and State agencies who receive requests for this type of information.

It may also be useful to pest control operators and others who may be made responsible for control of bird depredations whether in urban/industrial or agricultural situations. Most of the information in this report has been verified by the Environmental Protection Agency and the producers, however, some producers failed to respond to inquiries. This listing is a revision of Bird Damage Research Report nos. 20 and 46, respectively.

* SCHEMNITZ, S. D., ISMAIL, A. A. y GRAMLICH, F. J. Effectiveness of methiocarb for repelling birds in central Maine lowbush blueberry fields. Research in the Life Sciences 23(12):1-6. 1976. (225

SCHNOCK, G. y SEUTIN, E. A contribution to the ecologic study of alimentation in the ring dove (*Columba palumbus*) in Belgium. Aves 10(3):182-192. 1973. (226

SENGUPTA, S. The common baya (*Ploceus phillippinus*), a serious pest of agriculture. Current Science 43(4):124-125. 1974. (227

* SERIOUS BIRD damage to grain sorghum reported in Michigan. Crops and Soils 19(7):22. 1967. (228

SHARMA, I. K. Ecological studies of pestilence of grain crops by birds. Mysore Journal of Agricultural Science 10(3):471-478. 1976. (229

SHEPHERD, A. How the woodpigeon come and go. Country Life 162(4178):230. 1977. (230

SHIELDS, M. M., GRUBB JUNIOR, T. C. y TELIS, A. Use of native plants by monk parakeets in New Jersey. Wilson Bulletin 86(2):172-173. 1974. (231

* SHRIVASTAVA, S. K. y PHILIP, R. Screening of rice cultivars against bird damage. International Rice Research Newsletter 4(5):4. 1979. (232

Two thousand rice cultivars, maintained at the germplasm center, Baronda, were field screened against bird damage during 1978 kharif. Each cultivar was sown in three rows spaced 20 cm apart. Scoring was based on the percentage of damaged grains. No cultivar escaped bird damage; 13 had as much as 10% damage and 1,987 had more than 60%. Cultivars damaged least were Ajan, Ajwaine, Barhi, Danwar, Dawar, Koliar, Lakhokuwar, Manjhaligurmatia, Nunji, Parhi, Ratna, Surjajota, and Surmatia. Cultivars with brown-to black-husked grain showed less bird damage.

SHUMAKE, S. A., GADDIS, S. E. y SCHAFER JUNIOR, E. W. Behavioral response of Quelea to methiocarb mesurol. Proceedings of the Bird Control Seminar, no. 7:250-254. 1976. (233

SHUYLER, H. R. The role of FAO in vertebrate pest problems. Proceedings of the Vertebrate Pest Conference, no. 6:144-149. 1974. (234

SICK, H. Migrações de aves no Brasil. Brasil Florestal 9(39):7-10. 1979. (235

SIEGFRIED, W. R. Moult of the primary remiges in three species of *Streptopelia* doves. Ostrich 42:161-165. 1971. (236

_____. Weights of three species of *Streptopelia* doves. Ostrich 42:155-157. 1971. (237

_____. y UNDERHILL, L. G. Experiments on flocking as an anti predator strategy in doves. South African Journal of Science 71(6):188-189. 1975. (238

_____. y UNDERHILL, L. G. Flocking as an anti predator strategy in doves. Animal Behaviour 23(3):504-508. 1975. (239

SINGH, H. G. y JAIN, G. L. TMTD for control of damage by birds in wheat. Indian Farming 20(9):37, 49. 1970. (240

SOLMAN, V. E. F. Bird damage problems in Canada. Plant Health Newsletter Publication, B 84:44-50. 1978. (241

* SOTOMAYOR RIOS, A. Effects of rates and frequency of application of methiocarb as a bird repellent on sorghum. Journal of Agriculture of the University of Puerto Rico 61(3):332-336. 1977. (242

Un experimento se llevó a cabo en la finca experimental de Isabela del Instituto Mayaqüezano de Agricultura Tropical del Departamento de Agricultura de los Estados Unidos, con el propósito de evaluar en un sorgo de grano el efecto de methiocarb a dos niveles (2 y 4 kg/ha) aplicándose éste cada 1, 2, 3 y 4 semanas, respectivamente. Se sembró un híbrido de endosperma amarillo, 'DeKalb C-42y' en parcelas de cuatro surcos, 4 m de largo a distancia de 102 cm y se utilizó un diseño de parcelas divididas. Cada tratamiento se repitió cuatro veces. Se llevó a cabo además, un estudio para determinar el efecto del methiocarb en el porcentaje de germinación de la semilla en un período de tres semanas. Se establecieron parcelas adicionales del tratamiento que no recibió methiocarb (control) a 15 m al este del experimento principal. Estas parcelas se identificaron como control externo en contraste con las del control interno. Se estudió la producción de grano, porcentaje de rendimiento y peso de 25 espigas. Luego de la última aplicación de methiocarb todas las parcelas se evaluaron visualmente con

una escala de 0 al 5, siendo 5 la condición de mayor daño el de los pájaros. Los resultados indican que las aplicaciones de methiocarb no redujeron significativamente el efecto de los daños causados por los pájaros. Se concluyó que en los tratamientos adyacentes al control interno la aplicación de methiocarb fue beneficiosa, razón por la cual no se encontraron diferencias significativas entre éste y los demás tratamientos. Se observó un efecto significativo de ataque de pájaros en las parcelas establecidas fuera del límite de la aplicación del methiocarb (control externo). Los pesos de 25 espigas y el porcentaje de rendimiento fueron estadísticamente inferiores en el control externo al compararse con el control interno en una prueba de τ. El porcentaje de germinación de la semilla aumentó significativamente cuando éstas se trataron con methiocarb. Los resultados fueron consistentes en las tres pruebas realizadas cada semana.

STAUDE, J. Protection against bird damage. Angewandte Ornithol. 4(2-3):107-108. 1975. (243

STICKLEY JUNIOR, A. R. *et al.* Bird and mammal damage to mature corn in Kentucky and Tennessee. In Annual Conference of the Southeastern Association of Fish and Wildlife Agencies, 32nd, Columbia, South Carolina, 1978. Proceedings. Columbia, Southeastern Association of Game and Fish Commissioners, 1978. pp. 228-233. (244

STONE, C. P. y MOTT, D. F. Bird damage to sprouting corn in the United States. Washington, U.S. Bureau of Sport and Fish Wildlife. Special Science Report, no. 173. 1973. 28 p. (245

STONE, G. P. *et al.* Bird damage to field corn in New York in 1971. New York Fish Game Journal 20(1):68-73. 1973. (246

* STONE, R. J. Chemical repellents can save crops. World Crops 28(3):132-133. 1976. (247

The only foreseeable way to reduce crop losses from birds and mammals, without affecting the balance of nature, appears to lie in the field of non-toxic, non-phyto-toxic chemical repellents acting on the three chemical senses of smell, taste and the common chemical sense which generally reacts to irritants such as ammonia and acids, despite the fact that Soudek reported pigeons and partridges to be relatively immune to strong ammonia solutions. However, systematic studies have not been conducted on chemicals which stimulate the trigeminal nerves in birds. The main problem in formulating chemical repellents lies in the considerable variation in sensory perception and reaction, not just between species, nor within species,

but by each individual creature at different times under identical, controlled conditions. A great deal of work has been done in this field over the past hundred years or more, but the reports are as conflicting as they are numerous.

SUMMARS, D. D. B. y JONES, F. J. S. The importance of protein in the selection of fruit buds by bullfinches. Experimental Horticulture 28:47-50. 1976. (248

SWANK, W. G. Feather molt as an ageing technique for mourning doves. Journal of Wildlife Management 19:412-414. 1955. (249

* _____. Nesting and production of the mourning dove in Texas. Ecology 36: 495-505. 1955. (250

Mourning dove nesting studies were conducted during a portion of 1949 and 1951 and all of 1950 in the vicinity of College Station, Texas. The campus of the Agricultural and Mechanical College of Texas was excellent dove nesting habitat. For nest sites doves showed a preference for trees which contained leaves over trees which had not yet leafed out. Active nests were found in every month except November and December, but a truly active nesting period can be said to extend only from about March 10 to September 10. Of the nestings in which young were successfully reared to the fledgling stage those during May, June and July made up 72 per cent of the total. The number of nesting pairs on the area was in part limited by the territorial defense of the male of cooing perches and of nest material hunting grounds. The first week in June in 1950 there were 89 active mourning dove nests on an 81 acre study area. During the complete 1950 nesting season a total of 648 active nests were found on the area. In the first week in June in 1951 only 26 active nests were found. The decrease was attributed at least in part to a heavy winter-kill of doves the preceding February. From the number of young reared to fledgling stage by marked birds, the annual production was calculated to have been 77 per cent. Analysis of wings in hunter's bags showed that in September and October approximately 60 per cent of the population were birds of the year. Limited band returns indicate that first year birds from College Station had an 86 per cent mortality rate and older birds had a mortality rate of 45 per cent. The heavy mortality indicated for the first year birds is believed to be due to the great number of birds banded in 1950 that died during severe weather in 1951. Seven pairs of marked birds each reared to the flying stage an average of 6.7 young. Wings of doves taken by hunters in September and October showed an average of 3.34 young per pair of adults in 1949 and 3.04 young per pair of

adults in 1950. Data obtained from seven pairs of marked birds show that the distance between different nesting locations for a pair of doves rarely exceeds 200 feet.

THIOLLAY, J.-M. Example of natural predation on a nesting population of *Quelea quelea quelea* in Mali, Africa. Terre Vie 29(1):31-54. 1975. (251

* TIPTON, K. W. *et al.* Resistance of certain grain sorghum hybrids to bird damage in Louisiana. Agronomy Journal 62(2):211-213. 1970. (252

Several grain sorghum hybrids were evaluated for resistance to bird damage at Baton Rouge, Alexandria, and St. Joseph, La. Most of the damage was done by the English sparrow (*Passer domesticus*) during the milk stage of seed development. Loss from damage by birds varied from less than 1% to as great as 80% seed loss. Approximately one-half the hybrids tested exhibited considerable resistance to birds. Bird feeding on grain sorghum in the field continued on a limited scale until the crop was harvested. During the milk stage of seed development, the bird crushed or mashed the juices from the seed. After hardening, the seed was removed from the plant and swallowed whole. Chemical analyses of developing grain of susceptible and resistant hybrids showed that the contents of tannic acid and total astringents of a resistant hybrid were approximately eight and four times, respectively, greater than that of two susceptible hybrids. Content of tannic acid and total astringents did not change with seed maturity.

TOLLEMER, A. Lutte contre les etourneaux au 16. siecle. Defense des Vegetaux 32(194):241-242. 1978. (253

TOMIALOJC, L. The influence of the breeding losses on the results of censusing birds. Acta Ornithologica 14(6):243-250. 1974. (254

_____. The influence of predators on breeding wood pigeons in London parks. Bird Study 25(1):2-10. 1978. (255

TYLER, B. M. J. y KANNENBERG, L. W. Bird damage to corn. Canada. Ministry of Agriculture and Food. Ontario Ministry of Agriculture and Food Fact Sheet, no. 79-037. 1979. 3 p. (256

TYLER, J. D. y JENKINS, G. L. Notes on some fall foods of mourning doves in southwestern Oklahoma. Proceedings of the Oklahoma Academy of Sciences, no. 59:82-84. 1980. (257

* TYLER, P. S. Birds as pests of food stores. Tropical Stored Products Information 37:19-24. 1979. (258

The problems caused by birds in and around food stores and warehouses are described. The various alternative methods for prevention and control of pest populations are discussed. The essential precautions, especially when using poison baits, are emphasized.

UECKERMANN, E., DISCHNER, U. y LUELFING, D. Studies of pigoen landins in North Rhine, Westphalia, West Germany, between 1967 and 1974. Zeitschrift für Jagdwissenschaft 21(4):216-226. 1976. (259

* VALENCIA G., D. O problema das aves no arroz. Lavoura Arrozeira (Brasil) 25(270):47-48. 1972. (260

VANDEPUTTE-POMA, J. y DESMETH, M. Feeding growth and metabolism of the pigeon *Columba livia domestica*. Vlaams Diergeneeskd Tijdschr 47(3):231-235. 1978. (261

VASIC, V. F. Problems with starlings, sparrows and pigeons in Yugoslavia. Plant Health Newsletter Publication, B 84:23-30. 1978. (262

* WALPEN, M. E. Las cotorras y su control. CYTA (Argentina), no. 9:23-25. 1979. (263

La cotorra, *Myopsitta monacha monacha* (Boddaert), fue declarada plaga nacional para la agricultura mediante decreto No. 59840 del 30 de abril de 1935 y a nivel provincial a través de la ley no. 4390 del 2 de mayo de 1955. Cuando una bandada de cotorras ataca un sembradío, pueden esperarse pérdidas de un 20 a un 70%, según la intensidad de ataque, dañando los cultivares de trigo, girasol, sorgo, maíz, mijo, arroz y plantas frutales, comiéndose los frutos en sazón o en vías de madurez. A través del tiempo se utilizaron los siguientes métodos para su control: quema de nidos, compra de patas, armas de fuego, aplicación de alambre con yeso y Endrin en los nidos; pulverizaciones de nidos con solución Endrin, y finalmente el nuevo método de aplicación en las bocas de los nidos, de una mezcla de grasa mineral y Endrin. Estos dos últimos son los únicos que se utilizan en la actualidad. El nuevo método significa para los productores menor costo, máxima simplicidad y mínimo riesgo.

WARD, P. The breeding biology of the black-faced Dioch *Quelea quelea* in Nigeria. Machinisme Agricole Tropicale 107:326-349. 1965. (264

_____. Feeding ecology of the black-faced Dioch *Quelea quelea* in Nigeria. Machinisme Agricole Tropicale 107:173-214. 1965. (265

WARD, P. The migration patterns of *Quelea quelea* in Africa. IBIS 113:275-297. 1971. (266

_____. y POPE, G. G. Flight-tunnel experiments with red-billed Queleas to determine the distribution of a solution sprayed onto birds in flight. Pesticide Science 3(6):709-714. 1972. (267

_____. New views on controlling quelea. SPAN 15(3):136-137. 1972. (268

* _____. A new strategy for the control of damage by queleas. PANS. Pest Articles and New Summaries 19(1):97-106. 1973. (269

One of the more exasperating problems faced by many farmers in the drier parts of Africa is damage to their ripening cereal crops by the red-billed quelea, *Quelea quelea*. Distribution of *Q. quelea* over Africa, where the bird is a pest in at least 16 countries, nature of quelea damage and present control strategy are reviewed. In the author's opinion, it is not possible to control the numbers of this species in an economic way, therefore he proposes that queleas should only be destroyed when they threaten major areas of cereal production. (Abstracts on Tropical Agriculture 5:23737)

_____. y JONES, P. J. Premigratory fattening in three races of the red-billed quelea, *Quelea quelea*, an intra-tropical migrant. Journal of Zoology 181: 43-56. 1977. (270

_____. The role of the crop among red-billed *Queleas quelea-quelea*. IBIS 120(3):333-337. 1978. (271

_____. The war against the quelea bird. New Scientist 396:736-738. 1964. (272

WAY, R. D. y SHERBURNE, J. A. Bird damage to fruit crops. Plants and Gardens 27(3):79-83. 1971. (273

WEATHERHEAD, P. J. y BIDER, J. R. Management options for blackbird problems in agriculture (bird damage to corn and small grain crops in Quebec and Ontario). Phytoprotection 60(3):145-155. 1979. (274

WEATHERS, W. W. y CACCAMISE, D. F. Seasonal acclimatization to temperature in monk parakeets. Oecología 35(2):173-184. 1978. (275

WIENS, J. A. y DYER, M. I. Assessing the potential impact of granivorous birds in ecosystems. Pests, feed grain and seed crops. International Biology Programme 12:305-366. 1977. (276

WIGHT, H. M. A field technique for bursal inspection of mourning doves. Journal of Wildlife Management 20:94-95. 1956. (277

* WILLIAMS, J. G. The Quelea threat to Africa's grain crops. East African Agricultural Journal 19(3):133-136. 1954. (278

> Africa is threatened by a new plague to its cereal crops, a plague almost as serious as the great locust invasions of the past. The pest responsible for this danger to the economy is a small brown-coloured weaverbird, the dioch or quelea (*Quelea quelea*). Kenya became aware of this threat only in 1952, when vast swarms of queleas appeared in the wheat-growing localities of the Rift Valley Province. The quelea menace has long been known in the Sudan where millions of pounds' worth of damage have been caused to native-grown grain crops. Queleas are extremely irregular and unpredictable in their breeding habits. Experiments are still being conducted to discover an entirely satisfactory method of destroying large flocks of queleas which have already invaded farming areas - so far with only moderate success. The only effective method of eradicating the quelea as a pest to agriculture will be the long-term policy of continuous control of the birds' number in its breeding grounds (where this is possible) and in its non-breeding habitat.

WILSON, C. E. The Sudan dioch in grain growing areas. Sudan Notes and Records 28:151-156. 1947. (279

WILSON, R. T. y LEWIS, J. G. Observations on the speckled pigeon *Columba guinea* in Tigrai, Ethiopia. IBIS 119(2):195-198. 1977. (280

WINDSOR, D. M. Birds as predators on the brood of *Polybia barbouri, Polybia occidentalis* wasps (Hymenoptera: Vespidae: Polistinae) in a Costa Rican deciduous forest. Biotropica 8(2):111-116. 1976. (281

WOOD, G. W. y PEARCE, P. A. Reducing bird damage to lowbush blueberries with a carbamate repellent. Acta Horticola 61:201-204. 1977. (282

THE WOODPIGEON. London. Ministry of Agriculture, Fisheries and Food. Her Majesty's Stationery Office. Advisory leaflet, no. 165. 1976. 8 p. (283

YADAVA, C. P. S. *et al.* Predation of white grubs (*Halotrichia* spp.) by birds. Indian Journal of Entomology 35(2):169. 1975. (284

ZABADAL, T. J. y HOTHEM, R. L. Mesurol -- it's for the birds (chemical spray used to repel birds from vineyards). Wines & Vines 60(11):38-41. 1979.(285

_____. Mesurol for bird control in vineyards. Proceedings of the New York State Horticultural Society 125:119-121. 1980. (286

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30. Indice Latinoamericano de Tesis Agrícolas. Suplemento, no. 1, 1968-1972. 1974.

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32. Bibliografías agrícolas de América Central: EL SALVADOR. 1974.

33. Ecología del trópico americano; una bibliografía parcialmente anotada. 1974.

34. Bibliografías agrícolas de América Central: HONDURAS. 1974.

35. Bibliografía selectiva sobre reforma agraria en América Latina 1964-1972. 1974.

36. Manual para Descripción Bibliográfica. 2 ed. rev. en español para el AGRINTER. 1979.

37. Esquema de Categorías de Materias. 3 ed. rev. Trad. para uso del AGRINTER. 1979.

38. Indice de mapas de América Latina y el Caribe existentes en el IICA-CIDIA. 1975.

39. Bibliografías agrícolas de América Central: GUATEMALA. 1975.

40. Bibliografía selectiva sobre derecho y reforma agraria en América Latina, 1972-1974. 1975.

41. La mujer en el medio rural; bibliografía. 1975.

42. Bibliografía colombiana de pastos y forrajes. 1975.

43. Bibliografía sobre silvicultura y ecología forestal tropical. 1975.

44. Silvicultura de bosques tropicales; bibliografía. 1975.

45. Bibliografía internacional sobre la quínua y cañahua. 1976.

46. Bibliografía sobre camélidos sudamericanos. 1976.

47. Bibliografía sobre bovinos criollos de Latinoamérica. 1976.

48. Manual de organización, planificación y operación de los Comités Nacionales de Coordinación (PIADIC). 1976.

49. AGRINTER: orígen y evolución. Bibliografía anotada. 1976.

50. Bibliografía universitaria de la investigación agrícola en el Perú. 1976.

51. Directrices para la selección de documentos en los Sistemas AGRINTER y AGRIS. Rev. 1976.

52. Lista de publicaciones periódicas y seriadas. 1976.

53. Bibliografía sobre formas asociativas de producción en el agro. 1977.

54. Camote, maní y soya en América Latina, 1970-1975; una bibliografía parcialmente anotada. 1977.

55. Bibliografía sobre aspectos sociales de la producción agropecuaria en Colombia. 1977.

56. Bibliografía preliminar sobre recursos naturales de Colombia. 1978.

57. Bibliografía selectiva sobre desarrollo rural en Colombia. 1978.

58. Bibliografía sobre comercialización agrícola en América Latina y el Caribe. 1979.

59. Bibliografía selectiva sobre derecho y reforma agraria en América Latina y el Caribe, 1974-1977. 1978.

60. Royas del cafeto (*Hemileia* spp.); bibliografía. 3 ed. 1977.

61. Banco de datos de bibliografías agrícolas de América Latina y el Caribe; índice acumulado. 1977.

62. Normas de enriquecimiento de títulos utilizados en los Sistemas AGRINTER y AGRIS. 2 ed. 1980.

63. Vocabulario agrícola en español. 1978.

64. Bibliografía forestal del Perú. 1978.

65. La acción del IICA en el campo de las bibliotecas, documentación e información agrícola: una síntesis. 1978.

66. Bibliografía sobre ciencias de la información (aportes del IICA). 1978.

67. Bibliografía sobre peste porcina africana y peste porcina clásica; parcialmente anotada. 1978.

68. Centro Interamericano de Documentación, Información y Comunicación Agrícola-CIDIA. 1978.

69. Bibliografía forestal de América tropical. 1979.

70. Bibliografía selectiva sobre desarrollo rural en Venezuela. 1979.

71. Moniliasis; bibliografía parcialmente anotada. 1979.

72. Bibliografía sobre sensores remotos. 1979.

73. ISIS: Manual para usuarios. 1979.

74. Bibliografía básica sobre desarrollo rural latinoamericano. 1979.

75. Bibliografía selectiva sobre desarrollo rural en Ecuador. 1979.

76. Manual para la preparación de perfiles de área para la formulación de alternativas de producción en áreas específicas. 1979.

77. Sistema de Información para la Investigación Agropecuaria-SINIA. 1979.

78. Participación de la mujer en el desarrollo rural de América Latina y el Caribe; bibliografía. 1980.

79. Biomasa y otras fuentes no convencionales de energía; bibliografía. 1980.

80. Bibliografía sobre colonización en América Latina. 1980.

81. Análisis sobre el desarrollo del Sistema Interamericano de Información Agrícola-AGRINTER. 1980.

82. Rural women: a Caribbean bibliography with special reference to Jamaica. 1980.

83. Bibliografía Agrícola de Costa Rica. 2 ed. rev. y act. 1980.

84. Documentos producidos por el Fondo Simón Bolívar. 1980.

85. Catálogo colectivo de publicaciones periódicas existentes en bibliotecas agrícolas del Uruguay. 1980.

86. Bibliography of literature relating to research and development in the agricultural sector of Jamaica, 1959-1979. 1980.

87. Cáncer de los cítricos (*Xanthomonas citri*); bibliografía parcialmente anotada. 1980.

88. *Rhadinaphelenchus cocophilus*; anillo rojo del cocotero; una bibliografía parcialmente anotada. 1980.

89. Sigatoka del banano; bibliografía parcialmente anotada. 1980.

90. Mosca del Mediterráneo (*Ceratitis capitata*); bibliografía parcialmente anotada. 1980.

91. Mulher no Brasil; resumo bibliográfico. 1980.

92. Bibliografía sobre desarrollo rural en Bolivia. 1980.

93. Bibliografía agrícola del Uruguay, 1979-1980. 1981.

94. Páginas de contenido en medicina veterinaria. 1981.

95. Curso corto sobre Manejo de Datos de Investigación usando SAS. Trad. del inglés. 1981.

96. Catálogo colectivo de las publicaciones periódicas de las Bibliotecas del CIDIA. 1981.

97. Directorio de recursos humanos del Uruguay, en producción animal. 1981.

98. Una guía del usuario a la versión 3 del programa analítico de recursos geográficos. 1981.

99. Manual de organización de la información en archivos magnéticos (banco de datos). Encuesta rural Nicaragua, 1980. 1981.

100. Tristeza de los cítricos; bibliografía parcialmente anotada. 1981.

101. Manual de organización de la información en archivos magnéticos (banco de datos). Encuesta rural Pacífico Sur, Costa Rica. 1981.

102. Aves depredadoras; bibliografía parcialmente anotada. 1981.

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