

STORED PRODUCT PESTS IN NORTHERN QUEENSLAND.

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SUMMARY.

A survey of stored product pests in northern Queensland was made in 1942 and 1943 and supplementary information was gathered at intervals up to the end of 1945. Most attention was devoted to foodstuffs for human consumption.

*Thirty-four pest or potential pest species were recorded. The relative importance of all species at the time of the survey is indicated, but it is pointed out that under normal peacetime trading conditions this relationship may change to some extent. *Tribolium castaneum* Herbst. and *Corcyra cephalonica* Staint. were by far the most important, followed by *Calandra oryzae* L., *Oryzaephilus surinamensis* L. and *Ephestia cautella* Walk.*

*The recognition of *Corcyra cephalonica* as a major general pest, at least in northern Queensland, and of *T. castaneum* as an important pest of finely milled cereal products as well as many other commodities, were the outstanding findings of the survey.*

INTRODUCTION.

During 1942 and 1943 a survey was made of stored product pests in northern Queensland and interest in the problem was maintained until the end of 1945. Attention was concentrated on the important foodstuffs for human consumption; but, when opportunity offered, the insect fauna of other human foodstuffs, stock foods and other commodities and of factory and storage premises was investigated.

The survey was undertaken during a period when conditions were abnormal because of the war. A number of commodities normally in common use either were in very short supply or had disappeared entirely from ordinary trade channels. Also, in many cases, storage arrangements, which can have considerable influence on insect infestation, were not typical of peacetime commerce. Thus it could be expected that under normal trading conditions the relative importance of some of the species would be altered to some extent. In addition, further attention to stock foods, agricultural seeds, &c., would no doubt provide supplementary information which may also change the general picture in some particulars.

The territory covered in the survey extended along the coast from Mackay in the south (approximately 21° S. lat., 149° E. long.), to Cairns in the North (approximately 17° S. lat., 146° E. long.), and as far inland as Richmond (approximately 21° S. lat., 143° E. long.). Four main climatic types were involved, namely wet coastal, dry coastal, wet subcoastal highland, and dry inland.

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TABLE SHOWING RELATIVE IMPORTANCE OF STORED PRODUCT PESTS IN NORTHERN QUEENSLAND.

Insect.	Whole Grains.	Crushed and Cracked Grains.	Milled Cereal Products.	Processed Cereal Products.	Leguminous Seeds and Seed Products.	Dried Fruits.	Nuts and Nut Meats.	Tobacco and Other Dried Plant Products.	Dried Meats.	Factory and Warehouse Debris.
COLEOPTERA.										
FAM. TENEBRIONIDAE.										
<i>Tribolium castaneum</i> Herbst. ..	++	++++	+++++	++++	++	++++
<i>Tribolium confusum</i> J. du V. ..	+	+	++	+
<i>Gnathocerus cornutus</i> F. ..	+	..	++	++
<i>Palorus subdepressus</i> Woll. ..	+	+
<i>Latheticus oryzae</i> Waterh.	+
<i>Alphitobius piceus</i> Oliv.	+	+
Unidentified species	++
FAM. CURCULIONIDAE.										
<i>Calandra oryzae</i> L. ..	++++	++	+	++	+++
FAM. BOSTRYCHIDAE.										
<i>Rhizopertha dominica</i> F. ..	++	++	++	+	+	..	+
FAM. CUCUJIDAE.										
<i>Oryzaephilus surinamensis</i> L. ..	+	+	++	+++	..	+++	+++	+	..	++
<i>Oryzaephilus unidentatus</i> F.	+
<i>Laemophiloeus minutus</i> Oliv. ..	++	++	++	+
FAM. TROGOSITIDAE.										
<i>Tenebroides mauritanicus</i> L. ..	+	..	++	++
<i>Lophocateres pusillus</i> Klug.	++
FAM. PTINIDAE.										
<i>Lasioderma serricorne</i> F.	+	++	+	++	..	+
<i>Stegobium paniceum</i> L.	++	++	++
<i>Gibbium psyllodes</i> Czemp.	+
FAM. BRUCHIDAE.										
<i>Bruchus obsoletus</i> F.	++
<i>Bruchus quadrimaculatus</i> F.	++

FAM. NTIDULIDAE.											
<i>Carpophilus dimidiatus</i> F. . . . .	..	..	..	..	..	..	..	..	..	..	..
<i>Carpophilus hemipterus</i> L. . . . .	..	..	..	..	..	..	..	..	..	..	..
<i>Carpophilus fuscus</i> Man. . . . .	..	..	..	..	..	..	..	..	..	..	..
<i>Carpophilus</i> sp. . . . .	..	..	..	..	..	..	..	..	..	..	..
FAM. DERMESTIDAE.											
<i>Trogoderma</i> sp. . . . .	..	..	..	..	..	..	..	..	..	..	..
<i>Dermestes</i> sp. . . . .	..	..	..	..	..	..	..	..	..	..	..
LEPIDOPTERA.											
FAM. GALLERIIDAE.											
<i>Corcyra cephalonica</i> Staint.	+++	+++	+++++	+++++	++	+	++	+	+	++++	..
FAM. PHYCITIDAE.											
<i>Ephestia cautella</i> Walk. . . . .	..	..	..	..	..	..	..	..	..	..	..
<i>Ephestia kuhniella</i> Zell. . . . .	..	..	..	..	..	..	..	..	..	..	..
<i>Plodia interpunctella</i> Hbn. . . . .	..	..	..	..	..	..	..	..	..	..	..
FAM. GELECHIIDAE.											
<i>Sitotroga cerealella</i> Oliv. . . . .	..	..	..	..	..	..	..	..	..	..	..
THYSANURA.											
FAM. LEPISMATIDAE.											
<i>Ctenolepisma longicaudata</i> Esch. . . . .	..	..	..	..	..	..	..	..	..	..	..
COPEOGNATHA.											
FAM. TROCTIDAE.											
<i>Troctes divinatorius</i> L. . . . .	..	..	..	..	..	..	..	..	..	..	..
ACARINA.											
FAM. CALOGLYPHIDAE.											
<i>Thyraeophagus entomophagus</i> Lab. . . . .	..	..	..	..	..	..	..	..	..	..	..

PEST SPECIES.

The pest species encountered are listed in the accompanying table and an attempt is made to indicate their importance in various classes of stored products. In making this assessment, distribution throughout the area of survey, frequency of occurrence in any class of product and the population density usually found, were all taken into account. Thus a species widely distributed, frequently associated with the product and usually with a high population density is given the rating +++++, e.g., *T. castaneum* in milled cereal products. A species found only in numbers so small as to be of no practical importance is given the reading +, e.g., *C. cephalonica* in dried meats. Intermediate degrees of importance are shown by ++, +++, and ++++.

DISCUSSION.

The table shows that *Tribolium castaneum* and *Corcyra cephalonica* are the most important species. Because of the large size of the larva and its web-spinning habit, the latter is popularly regarded as the more serious pest, but in fact it probably does not contaminate a greater quantity of foodstuffs.

C. cephalonica has not been recognized previously as a major stored product pest in Queensland. It has not even yet been recorded from southern parts of the State, though its distribution elsewhere suggests that conditions in the south are not unfavourable to it. If present, it must therefore be of only incidental importance. The very wide range of materials attacked in the north should be noted.

T. castaneum is generally regarded more as a secondary pest of whole grains than as a primary pest of finally milled cereal products. However, in northern Queensland it reaches its maximum development in the latter capacity. The comparative scarcity of the closely allied *T. confusum* is of interest. Climatic conditions would not appear to offer any barrier to its successful establishment, as, when it did occur, populations were often large and thriving laboratory colonies were maintained for many months at a dry coastal station. The closely related *Gnathocerus cornutus* is given an equivalent ranking to *T. confusum*. It is, however, somewhat more widely distributed but, on the other hand, populations do not attain the density of those of the latter species.

Next in order of importance to *T. castaneum* and *C. cephalonica* are *Calandra oryzae*, *Oryzaephilus surinamensis* and *Ephestia cautella*.

The status of *C. oryzae* may well be increased when a more detailed study is made of whole grains and other favoured breeding materials for this species. Population samples from various sources were examined for strain differences; only the large strain was found. It is interesting to note that the companion species *C. granaria* was not recorded.

Oryzaephilus surinamensis and *Ephestia cautella* may increase in importance when certain commodities, notably dried fruits, nuts and nut meats, herbs, spices, confectionery, &c., circulate freely again. *Plodia interpunctella*, *Stegobium paniceum* and *Lasioderma serricorne* would also be expected to play a more important part in the contamination of such products.

Bruchus spp. are probably of somewhat greater importance than indicated as pests of leguminous seeds for agricultural purposes. Similarly *Sitotroga cerealella* may occur more commonly as a pest of maize, particularly in the field. Beetles of the family *Dermestidae* probably occur commonly in association with certain products of animal origin, such as hides and skins.

The unidentified species of *Tenebrionidae* was fairly prevalent in debris associated with grain crushing machinery at one centre. A pure colony was maintained in white flour in the laboratory for some months but the rate of increase was small compared with that of *Tribolium* spp. Nevertheless, the beetle is presumably a minor pest.

Thyraeophagus entomophagus and perhaps other species of mites may be more prevalent than shown by this survey, as when special methods of examination were not used many cases of mild infestation may well have passed undetected. However, development of the characteristic "musty" odour in such commodities as flour, due to gross infestation by mites, was not encountered and mite infestation therefore seems of minor importance in northern Queensland, at least under most conditions.

The superiority of wholemeal flour to white flour as a breeding medium for many species is thought to be of little practical importance in northern Queensland. Large populations of certain species, notably *T. castaneum* and *C. cephalonica*, will quickly develop in white flour in the tropics. Initial contamination, the risk of which must be greater in the case of coarse-ground materials, is believed to be a more important factor governing rate of deterioration due to insect infestation.

There is obviously no relation between distribution and population densities of the major pest species and the main climatic zones of the area surveyed. Sufficient evidence is not available to indicate if climate has any influence on distribution or population levels of the less prevalent species.

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