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Re stemborers, desert-locusts, tsetse-flies, cassava mealy-bugs, anopheles-flies, neem-products, silk-production, capacity-building.

Stemborers, the push-pull-system and parasitoid wasp

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| Title | Intercropping increases parasitism of pests |
| Author(s) | Khan, Z.R. Ampong-Nyarko, K. Chiliswa, P. Hassanali, A. Kimani, S. Lwande, W. Overholt, W.A. Pickett, J.A. Smart, L.E. Wadhams, L.J. Woodcock, C.M. |
| Serial Title | Nature |
| Volume/Issue | 388 (14 August) |
| Collation/Pagination | p. 631-632, ill., fig., 13 ref. |
| Publication Year | 1997 |
| Abstract | As part of a programme for controlling lepidopteran stem-borers in cereal crops in Africa, the effectiveness of combined cropping regimes of cultivated and wild plants for reducing stem-borer damage has been investigated. Intercropping with the non-host molasses grass, <i>Melinis minutiflora</i> , significantly decreased levels of infestation by stem-borers in the main crop and also increased larval parasitism of stem-borers by <i>Cotesia sesamiae</i> . Volatile agents produced by <i>Melinis minutiflora</i> repelled female stem-borers and attracted foraging female <i>Cotesia sesamiae</i> . One of the volatile components released by intact <i>Melinis minutiflora</i> which attract parasitoids is also produced by herbivore-damaged plants and is implicated more widely as a cue for stimulating predation and parasitism. |
| Keywords | cotesia sesamiae; intercropping; maize; melinis minutiflora; parasites; pests; sorghum bicolor; stem-borers; zea mays |

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| Title | Utilisation of wild gramineous plants for management of cereal stemborers in Africa |
| Author(s) | Khan, Z.R. Chiliswa, P. Ampong-Nyarko, K. Smart, L.E. Polaszek, A. Wandera, J. Mulaa, M.A. |

Serial Title Insect Science and Its Application
 Volume/Issue 17(1)
 Collation/Pagination p. 143-150, 6 tables, 30 ref.
 Publication Year 1997
 Abstract Field trials in Kenya demonstrated that the forage grass, *Sorghum vulgare sudanense* (Sudan grass) attracted greater oviposition by stemborers than cultivated maize, resulting in significant increase in maize yield. On the other hand, the non-host forage plant, *Melinis minutiflora* (molasses grass), when inter-cropped with maize, repelled gravid stemborer females from ovipositing on maize, resulting in significant reduction in stemborer infestation. Using these trap- and repellent gramineous plants, a novel pest management approach based on a 'push-pull' or stimulo-deterrent diversionary strategy is being developed where stemborers are repelled from the food crop and are simultaneously attracted to a discard or trap crop. The plant composition and permanence of habitat surrounding maize fields also influence the abundance of natural enemies that invade agroecosystems once a pest population is present. It may be advantageous to promote the growth of native Gramineae and other wild plants which minimise, or even suppress, population growth of pests during non-cropping seasons, but still provide a suitable habitat for natural enemies.

Keywords africa; alternative hosts; environmental management; *melinis minutiflora*; *sorghum vulgare sudanense*; stemborers; wild plants

Title **A review of the introduction and establishment of *Cotesia flavipes* Cameron in East Africa for biological control of cereal stemborers**

Author(s) Overholt, W.A. Ngi-Song, A.J. Omwega, C.O. Kimani-Njogu, S.W. Mbapila, J. Sallam, M.N. Ofomata, V.

Serial Title Insect Science and Its Application
 Volume/Issue 17(1)
 Collation/Pagination p. 79-88, 2 tables, 69 ref.
 Publication Year 1997
 Abstract *Chilo partellus* Swinhoe (Lepidoptera: Pyralidae) is an exotic stemborer of cereal crops in Africa which invaded the continent from Asia earlier this century. In addition to *Chilo partellus*, several indigenous stemborers are found in Africa. In 1991, *Cotesia flavipes* Cameron (Hymenoptera: Braconidae), a gregarious endoparasitoid of stemborers in Asia, was introduced into Kenya for biological control of *Chilo partellus*. Laboratory studies revealed that the parasitoid could successfully parasitise not only the

target stemborer, but also two native stemborers that occur sympatrically with *Chilo partellus* in some locations. Interbreeding studies demonstrated that *Cotesia flavipes* would mate with a native congener, *Cotesia sesamiae* (Cameron), but no female offspring resulted from these matings. Investigations on competition between the two *Cotesia* spp. indicated that when *Chilo partellus* was the host, *Cotesia flavipes* appeared to be a superior parasitoid. Releases of *Cotesia flavipes* were made in 1993 in Kenya. Recoveries in 1994, 1995 and 1996 demonstrated that the parasitoid was firmly established in two regions of Kenya and in northern Tanzania. Preliminary observations suggest that the parasitoid is causing greater mortality to stemborers in southwestern Kenya than in the coastal area.

Keywords biological control; *chilo partellus*; *cotesia flavipes*; east africa; parasitoids; stemborers

Desert-locust

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| Title | Semiochemical research on the desert locust <i>Schistocerca gregaria</i> (Forsk.) at Icipe: Rationale and scope |
| Author(s) | Hassanali, A. Mahamat, H. |
| Collation/Pagination | p. 5-12, ill., fig., 35 ref. |
| Publication Year | 1991 |
| Abstract | The most important feature of the desert locust is its ability to interconvert between two morphologically, physiologically and behaviourally distinct phases: the solitaria and the gregaria. Under endemic conditions in recession areas, which are characterised generally by dry and warm weather, the solitaria prevails. This phase lives as dispersed individuals in very low densities in scattered populations, feeding on a limited range of desert plants, and reproducing only when environmental conditions are sufficiently favourable. Under spells of dry weather maturation may be totally arrested, a condition which has been referred to as "reproductive diapause". When weather and vegetation conditions improve, maturation is resumed and breeding and rapid increase in numbers take place. Transformation to the gregarious phase is associated with dense concentrations of solitarious locusts, resulting from both immigration from neighbouring areas and breeding, the process going through a series of the so called transient forms. The gregarious phase is characterised by a highly cohesive behaviour, long-distance migratory aptitude, polyphagy, synchronous and accelerated maturation of males and females and mass egg-laying by gravid females at |

common sites. It is this remarkable set of characters of the gregarious phase that makes the desert locust such a devastating pest.

Keywords schistocerca gregaria; semiochemicals

Title **Effects of shifting to crowded or solitary conditions on pheromone release and morphometrics of the desert locust, *Schistocerca gregaria* (Forsk.) (Orthoptera: Acrididae)**

Author(s) Deng, A.R. Torto, B. Hassanali, A. Ali, E.E.

Serial Title Journal of Insect Physiology

Volume/Issue 42(8)

Collation/Pagination p. 771-776, ill., fig., tables, 30 ref.

Publication Year 1996

Abstract The effect of shifting the desert locust, *Schistocerca gregaria* (Forsk.) from crowded to solitary conditions, or vice versa on the emission of the adult aggregation pheromone (as measured by released phenylacetone nitrile) and compared this with changes in morphometrics, has been studied. Adult males of the F₀ generation resulting from shifting crowd-reared (gregarious) hoppers, fledglings or mature adults (aged 20-22 days after the final moult) to solitary conditions did not produce phenylacetone nitrile, similar to solitary-reared adults. Conversely, adults of the F₀ generation resulting from shifting solitary-reared (solitarious) hoppers, fledglings or mature adults to crowded conditions produced pheromone at levels which were not significantly different from those of control adults from the crowd-reared colony. The levels of pheromone increased in the F₁ generation but decreased and leveled off in the F₂ and F₃ generations. Extreme sensitivity to crowding was demonstrated by the fact that even pairing of one solitarious hopper with another produced F₀ adult males that produced phenylacetone nitrile, although in significantly lesser amounts than by males reared at a density of four per cage or by crowd-reared control males. In contrast, morphometrics changes were slow and required several generations. The F/C ratio (hind-femur length to head capsule width) was more sensitive to treatment effects than the E/F ratio (fore-wing to hind-femur length), in agreement with previous findings. It is concluded that pheromone titres are a more sensitive measure than morphometrics to determine the onset of phase change in the desert locust.

Keywords acrididae; pheromones; schistocerca gregaria

Cassava mealybug

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| Title | Cassava and cowpea in Africa |
| Author(s) | Herren, H.R. |
| Serial Title | Biotechnology and Integrated Pest Management (ed. G.J.Persley) |
| Volume/Issue | 15 |
| Collation/Pagination | p. 136-149 |
| Publication Year | 1996 |
| Abstract | The two case studies presented in this chapter help to explain how plant-health management works, from concept to implementation. The first gives the success story of biological control of the cassava mealybug (CM); illustrates how this holistic approach was first developed and successfully implemented at the International Institute of Tropical Agriculture (IITA), and how this created the basis for an ecologically sustainable cassava plant-protection project (ESCaPP). The same agroecosystem approach was subsequently applied to face the challenges of the cowpea pest problem, a project that is still ongoing and where biotechnology applied to host-plant resistance might be part of the solution. The results should be helpful in developing an environmentally sustainable cowpea plant-protection strategy. First elements of such a strategy have already found their way into farmers' fields. In the Kano area of Nigeria, farmers are adopting local varieties improved in the area of insect and striga resistance through traditional breeding methods. |
| Keywords | africa; biological control; cassava; cowpea; plant disease control |

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| Title | Cassava pest and disease management: An overview |
| Author(s) | Herren, H.R. |
| Serial Title | African Crop Science Journal |
| Volume/Issue | 2(4) |
| Collation/Pagination | p. 345-353, 17 ref. |
| Publication Year | 1994 |
| Abstract | The International Institute of Tropical Agriculture (IITA), the Centro Internacional de Agricultura Tropical (CIAT), and many national agricultural research systems (NARS) have devoted considerable attention to cassava improvement. However, many biotic constraints still limit the expansion of this crop in many tropical areas. Host-plant resistance and biological control are the cornerstones of crop protection measures against |

biotic stresses on cassava (*Manihot esculenta* L.). Genetic improvement has focussed on African cassava mealybug and the cassava green mite has been highly successful using parasitoids natural enemies introduced from Latin America, the original home of cassava. Sustainable plant health management (PHM) that considers the crop plant as a component of an agro-ecosystem holds promise for management of diseases and pests on cassava.

Keywords biological control; host-plant resistance; manihot esculenta

Tsetse-fly

Title **Towards community based and sustainable tsetse management - A report by the ICIPE Tsetse Research Programme**

Author(s) Otieno, L.H. Dransfield, R.D.

Serial Title Rural Development in Practice

Volume/Issue 2

Collation/Pagination p. 31-32, 10 ref.

Publication Year 1990

Abstract From 1981 ICIPE Tsetse Research Programme initiated studies on tsetse ecology emphasising population sampling methodology, population dynamics and vectorial capacity. They all concentrated on *Glossina pallidipes*, the main vector of animal and human trypanosomiasis in eastern Africa. The first was in Nguruman escarpment, southwest of Kenya. The objective was to gain a great understanding of tsetse population dynamics and disease epidemiology to improve tsetse control strategies. The other was to develop low cost control technologies that could be used to suppress tsetse populations and then maintain them at low levels to reduce disease incidence in cattle. The final aim was to maximise community participation in tsetse control operations. By the end of 1986 sufficient progress had been made in suppressing of tsetse populations at Nguruman. The general picture is of a 99. reduction in numbers of *Glossina pallidipes* in the dry seasons and a 90. reduction during the rainy season.

Title **A sampling bias model for odour-baited traps in relation to tsetse hunger cycle and population suppression**

Author(s) Odulaja, A. Madubunyi, L.C.

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| Serial Title | Ecological Modelling |
| Volume/Issue | 104 |
| Collation/Pagination | p. 165-173, ill., fig., 18 ref. |
| Publication Year | 1997 |
| Abstract | Eight progressive stages of midgut evacuation (MES), which reflect increasing degrees of hunger, were used to define the hunger cycle in tsetse. The distribution of flies in all eight MES in thriving tsetse populations, as well as in odour-baited trap catches, was modeled using exponential and a probability density functions, respectively. These distributions enabled derivation of the proportion (p) of a tsetse population that succumbs daily to a sampling device. This parameter proved useful for evaluating the bias of cow urine-baited NG2G trap samples of <i>Glossina pallidipes</i> , and for estimating trapping mortality and the required period and trap density for tsetse control. The higher the value of p, the less biased the sample and the higher the trapping mortality; the shorter the period, the fewer the number of traps required for achievement of tsetse control. Simulations based on field data and parameter estimates in the published literature predict that ICIPE's NG2G traps baited with cow urine may achieve up to an average of 97 and 98. reduction of <i>Glossina pallidipes</i> populations in 1 year. The traps may achieve up to a 98. reduction in 1 year, in 75. of suppression trapping campaigns. It will require about 2 years to achieve a 99.9. reduction in the fly population, given these parameters. |
| Keywords | <i>glossina pallidipes</i> ; odours; population; sampling; trapping |

Anopheles fly and malaria

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| Publication detail | Call Number RE-561 |
| Title | Some observations on the biting behavior of <i>Anopheles gambiae</i> s.s., <i>Anopheles arabiensis</i>, and <i>Anopheles funestus</i> and their implications for malaria control |
| Author(s) | Githeko, A.K. Adungo, N.I. Karanja, D.M. Hawley, W.A. Vulule, J.M. Seroney, I.K. Ofulla, A.V.O. Atieli, F.K. Ondijo, S.O. Genga, I.O. Odada, P.K. Situbi, P.A. Oloo, J.A. |
| Serial Title | Experimental Parasitology |
| Volume/Issue | 82 |
| Collation/Pagination | p. 306-315, ill., fig., 4 tables, 24 ref. |
| Publication Year | 1996 |
| Abstract | Studies were carried out in three villages in western Kenya on the biting |

behavior of *Anopheles gambiae* s.s., *Anopheles arabiensis*, and *Anopheles funestus*. Blood feeding behavior and departure from houses were studied under the impact of permethrin-impregnated eaves-sisal curtains. Only 2-13% of the female vector population was collected biting before 2200 hr. Over 90% of the villagers went to bed by 2100 hr. *Anopheles funestus* was 6.6-8.2 times more likely to bite people indoors than outdoors, while *Anopheles gambiae* s.l. females were only 2 times as likely. Under the influence of permethrin-impregnated sisal curtains placed under the eaves of village houses, there was a marked egress of blood-fed *Anopheles funestus* and *Anopheles gambiae* s.s. Permethrin seems to have induced exophily of half-gravid female *Anopheles gambiae* s.s. While *Anopheles gambiae* s.s. remained highly anthropophilic under the impact of permethrin, *Anopheles funestus* shifted to feeding more on cattle. *Anopheles arabiensis* were largely zoophilic. These results underline the difficulties of controlling *Anopheles gambiae* s.s. the principal African malaria vector.

Keywords *anopheles arabiensis*; *anopheles gambiae*; permethrin; *plasmodium falciparum*

Title **Host blood meals and chromosomal inversion polymorphism in *Anopheles arabiensis* in the Baringo District of Kenya**

Author(s) Mnzava, A.E.P. Mutinga, M.J. Staak, C.

Serial Title Journal of the American Mosquito Control Association

Volume/Issue 10(4)

Collation/Pagination p. 507-510, ill., 3 tables, 19 ref.

Publication Year 1994

Abstract Studies were carried out in the villages of Kapkuikui and Maji-Ndege in the Lobo area of Baringo District, Kenya, to obtain baseline data on species identification of the *Anopheles gambiae* group, their feeding and resting behavior, and their frequencies of chromosomal inversions. This was carried out towards predicting the effect of introducing permethrin-impregnated cloths or other intervention measures. In this study, *Anopheles arabiensis* was identified as the only species of the *Anopheles gambiae* group. This species contained 2 inversions, 2Rb and 3Ra, occurring at frequencies ranging from 55 to 60% , and from 5 to 11% , respectively. There was no evidence for nonrandom mating. Indoor- and outdoor-collected samples were significantly different in respect of inversion 3Ra in one village and in the distribution of the different sources of blood meals in both areas. In these villages, 37% of indoor-resting mosquitoes fed outside before entering

houses to rest.
Keywords anopheles arabiensis; anopheles gambiae; host blood meals; polymorphism

Neem-products

Title **Insecticides from neem**
Author(s) Saxena, R.C.
Serial Title Series 387
Collation/Pagination p. 111-134, bibliography p. 129-135
Publication Year 1989
Abstract Derivatives of neem (*Azadirachta indica* A. Juss) have traditionally been used by farmers in Asia and Africa to ward off insect pests of household, agricultural and medical importance. Unlike ordinary insecticide based on single active ingredients, neem derivatives comprise a complex array of novel compounds which have diverse behavioral and physiological effects on insects. Repellency, feeding and oviposition deterrence, growth and reproduction inhibition, and other effects have been attributed to neem compounds - azadirachtin, salannin, meliantriol, etc, that occur mainly in the seed. However, the complexity of chemical structure of these compounds preclude their synthesis on a practical scale. Therefore, the use of simple formulations of neem derivatives such as leaf or kernel powder or extracts need to be popularized. Their being safe to non-target organisms, including humans, make them ideal insecticides. Several azadirachtin-rich formulations have already been commercialized for use of nonfood and food crops.
Keywords africa; asia; azadirachta indica; azadirachtin; behaviour disorders; functional disorders; insect pests; insecticides

Fruit-fly

Title **Fruit fly (Diptera: Tephritidae) species identification: a rapid molecular diagnostic technique for quarantine application**
Author(s) Armstrong, K.F. Cameron, C.M. Frampton, E.R.
Serial Title Bulletin of Entomological Research
Volume/Issue 87
Collation/Pagination p. 111-118, ill., fig., 2 tables, 33 ref.

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| Publication Year | 1997 |
| Abstract | <p>New Zealand is currently the only major fruit production country in the world that is free of economically important fruit flies. As part of the effort to maintain this status, there is a need to supplement quarantine decision-making procedures with a means of rapidly identifying immature life stage infestations to the species level. Here is described a molecular method that achieves this, using simple restriction patterns of ribosomal DNA (rDNA) as diagnostic markers. The 18S and 18S plus internal transcribed spacer (ITS) regions were amplified from larval DNA by the polymerase chain reaction (PCR). Nineteen species, spanning four genera (including five subgenera of <i>Bactrocera</i>) were analysed. Restriction analysis of the 18S PCR product provided poor resolution, even at the generic level. Digestion of the 18S+ITS PCR product, however, generated thirteen diagnostic haplotypes as defined by the composite restriction patterns from <i>Rsa</i>I, <i>Sau</i>3a <i>Hae</i>III and <i>Alu</i>I. No variation was detected at these restriction sites within or between populations. Twenty two restriction enzymes have been screened, but diagnostic RFLPs have yet to be found for six out of the ten <i>Bactrocera</i> (<i>Bactrocera</i>) species; <i>Bactrocera passiflorae</i> (Froggatt) cannot be distinguished from <i>Bactrocera facialis</i> (Coquillet), nor <i>Bactrocera kirki</i> (Froggatt) from <i>Bactrocera trilineola</i> (Froggatt) or <i>Bactrocera neohumeralis</i> (Hardy) from <i>Bactrocera tryoni</i> (Froggatt). Geographic origin could assist in distinguishing the first four species, but the latter pair are very closely related with overlapping origins, hosts and adult morphology. All six species, however, are considered high risk with respect to their likely establishment in New Zealand. Therefore diagnosis based on this molecular technique would support the same quarantine decision. It is considered that this method could be useful as a diagnostic technique and directions for further development are discussed.</p> |
| Keywords | diagnostic techniques; diptera; identification; quarantin |

Silk-moth

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| Title | Some features of silk-producing moths |
| Author(s) | Gongyin, Y. Cui, H. |
| Serial Title | Tropicultura |
| Volume/Issue | 14(1) |
| Collation/Pagination | p. 30-33, ill., fig., 3 tables., 8 ref. |
| Publication Year | 1996 |

Abstract Species and distribution of main silk-producing moths in the world are reviewed. Main biological characteristics, properties of cocoon and silk of four important silk-producing moths, such as *Bombyx mori*, *Antheraea pernyi*, *Antheraea yamamai*, *Philosamia cynthia ricini* are described. Applications of cocoon and silk of the four important silkmoths are also shown.

Keywords bombyx mori; cocoons; silk; silkworms

Capacity-building and food security

Title **Global environmental and food security: Importance of arthropod diversity**

Author(s) Herren, H.R.

Serial Title Man & Development

Volume/Issue March

Collation/Pagination 94-108, 19 ref.

Publication Year 1998

Abstract Biological resources are the basis of the prosperity of the developed world; yet the biologically rich underdeveloped nations of Africa, and to a lesser extent of Asia and Latin America, are the economically poorest in the world. This is all the more ironic because much of the agricultural wealth of the developed North has been based on the genetic resources of the South. The benefit from the exploitation of this diversity reaches hundreds of billions of dollars annually for the countries of the North, but unfortunately yet much less for the developing countries which are under great pressure to grow more food for their ever-increasing population. There is, therefore, an urgent need not only to assess the wealth of the biodiversity in the regions, but also to catch up with the task of capacity-building and education of the civil society and its leaders to care for this valuable natural resource and establish the necessary policies for its inventory and sustainable use.

Keywords agriculture; arthropods; biodiversityecology; diversity; food production