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# PREVENTATIVE CONTROL FOR DESERT LOCUST PEST IN AFRICA: EXPERIENCES OF MAURITANIA

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*Mohamed Abdallahi Ebbe* (known as *Ould Babah*) holds a doctorate degree in entomology/ acridology from l'Ecole pratique des hautes études (in Paris). He is a Chevalier of the Mauritania Order of Merit and has been given the Sir Boris Uvarov Award by the International Orthopterists' Society (in the United States). His expertise is in the area of acridology and anti-locust management and control. He has worked in Mauritania for 28 years and served as an international consultant in many African and Arab countries. He is currently director general of the National Centre for Desert Locust Control (in Mauritania).

# ABSTRACT

For many centuries, the Desert Locust has been seen as a major threat to the agro-pastoral resources in the world's most warm and temperate climates, including South of the Sahara. *Schistocerca gregaria* (Forsk., 1775), in the Acrididae family and Cyrtacanthacridinae subfamily has always been the most feared. Its first written presence was over 3000 years ago, it has especially been noted in sacred books (Torah, Bible and Koran). The plague of this phytophagous can be extremely destructive and cause substantial losses to crops and pastures. Many confirm that although intermittent, the locust ravages span from the Middle Ages to the present.

The population dynamics of this Trans-boundary pest alternate during periods of recession (solitary phase), upsurge, outbreak (transient phase) and plague (gregarious phase). In recession, the locust remains dispersed: in a solitary or transient form, with the possibility of reproduction in restricted areas to less than 40% of the plague area and covering the desert areas ranging from West Africa to Southwest Asia, the area of breeding has reached about 13.6 million km<sup>2</sup>. In case of plague, it threatens about 60 countries, agriculture and grazing, including some of the world's poorest. These countries cover a total area of more than 31 million km<sup>2</sup>, nearly 25% of the land inhabited by a tenth of the world's population.

The range of the locust breeding area is divided into three regions: Western, Central and Eastern. The exchange of populations between the various parties and different areas of the same sub-region are numerous and frequent, especially between East Africa and West Africa. They are seasonal and regular between the Saharan-Sahelian zones of Africa and the Northwest. Since 1860, eight periods of plague have succeeded, with durations ranging from 3 to 22 years. In addition, over the last 40 years, four major outbreaks were observed: 1968, 1987/88, 1993-95 and the last in 2003-05 in the western region. The results of an independent evaluation of this last outbreak shows that in the Sahel, over 8 million people have suffered from the plague while agricultural losses have affected 80-100% of the expected crop. The plague has made the long-term food security of local people even more uncertain. Increasing poverty and vulnerability of populations, already, living in precarious conditions.

International coordination for this plague was made on behalf of countries and the United Nations by Food and Agriculture Organization (FAO), which has a group and an information and forecasting service dedicated to this activity and three regional commissions. To be effective in prevention, countries of the recession area must maintain an institution that is consistently vigilant, well-equipped with material and qualified human resources. In our western region (Sahel-Maghreb), most countries have developed, established and maintained institutional structures while adapting preventative control methods. This can be attributed to the anti-locust policy initiated by the Locust Commission in charge of the coordination in Western Region (CLCPRO) as well as to all their countries members, their strong determination in addition to continued solidarity between them and the support of their partners: World Bank, African Development Bank, France, Food and Agriculture Organization, the Emergency Prevention System (EMPRES), USAID, Japan, etc. However, further constraints to overcome for the full implementation remain. Particularly in some front line Sahelian countries, including insufficiency of budget and security problems in the gregarious and breeding areas.

As an example: Mauritania, which is a sahelian country, shelter many permanent habitats and outbreaks areas of the Desert Locust, *Schistocerca gregaria*. Since the 1950's, a preventative control strategy was progressively applied in various organizational and operational forms, in particular by the OCLALAV, a regional locust control organization. The Mauritanian government began to take over the responsibility for Desert Locust survey and control in 1980. A specialized national unit in charge of early warning and early control operations was created in 1989, then transformed into a National Anti-locust Center in 1995 and finally upgraded as an autonomous institution since 2006.

The Mauritanian National Anti-Locust Centre (CNLA) is charged with monitoring and controlling the desert locust to contribute to the fight against poverty and to the security of food supplies, in Mauritania and neighboring countries. The Centre promotes preventive controls to break the breeding sequence by intervening as early as possible against gregarious populations. This means that well-directed and correctly implemented surveys are necessary to provide precise information on the locust and to allow early warning and rapid treatment in a safe and effective manner. When high densities of the locust are found along with favorable ecological conditions, a decision is taken on whether to control the population. The decision depends on the location, behaviour, maturation and density of infestations of the locust, as well as on the resources available. Pesticides and application methods are chosen so as to provide control that does as little environmental harm as possible. The centre is constantly looking to improve its methods, making sure that pesticides are used efficiently and with minimal environmental impact. Since 1985, increasingly regular survey and control campaigns have been led, as well against invasions (1987/88, 1993/94, 2003/2005) as against local outbreaks. Significant investments have been made, by the Mauritanian government with the collaboration of his partners, in the capacities development, particularly, the human resources', the infrastructures, logistical equipment and all potential working tool such as: remote sensing, high technological tool for information transmission, Data base and GIS. As example: the biggest locust database in the affected countries was made up, computerized and exploited; it resulted in an improvement of survey operations and in a reduction of the costs from approximately 30%. A decision-making system for the management of locust control campaigns was developed too. Research was undertaken to study the possibility to introduce, in preventative locust control, biological products as an alternative to chemical pesticides and also to covers many others fields key topics in a very wide international collaborative partnerships including JIRCAS.

Comparative analysis of the respective costs of control campaigns against invasions and preventative control campaigns shows a net financial advantage in favors of the last, the costs being able to be in this case 100 times lower.

Mauritania holds, however, only a part of the problem since the outbreak areas of the Desert Locust are widely distributed in other countries, which must also develop, in a coordinate manner, their own system for survey and control.

## KEYWORDS

Desert locust, Mauritania, preventative control strategy, Sahel, CNLA

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LOCUST PEST IN AFRICA :  
EXPERIENCE OF MAURITANIA**

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**Presentation Outline**

1. The problem: Desert locust plague
2. The desert locust at the global and regional level
3. The Desert Locust in Mauritania
4. Management of the Desert Locust in Mauritania
  - a) Institutional management
    - Flow chart
    - Human resources
    - Infrastructure
  - b) Operational management
    - Locust information Management
    - Desert Locust Survey and Control
  - c) Research and Environment
    - Research and Capacity Building (R&D)
    - Environment
5. Conclusion and perspectives

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**The problem: Desert locust plague**

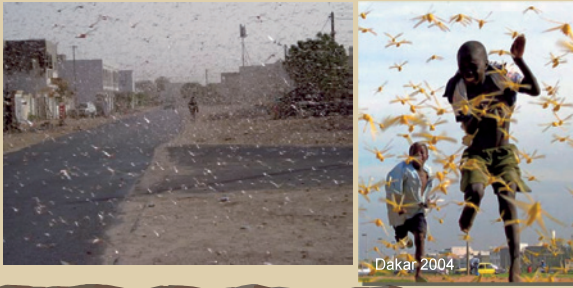
- More than 3 000 years ...Crop loss from locusts was noted in the **Thorah**, **Bible** and **Qur'an** (Egyptian 8th plague)
- Plagues of desert locusts have threatened agricultural production in Africa, the Middle East, and Asia for centuries



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**The problem: Desert locust plague**

- And still today
  - ... in all over the Sahara
  - ... and the Sub-Sahara




Dakar 2004

4

**The problem: Desert locust plague**

- One of the major scourges of humanity: the disastrous consequences of its invasion;
- Since 1880, 80 years of invasions, 2 out of 3 years.



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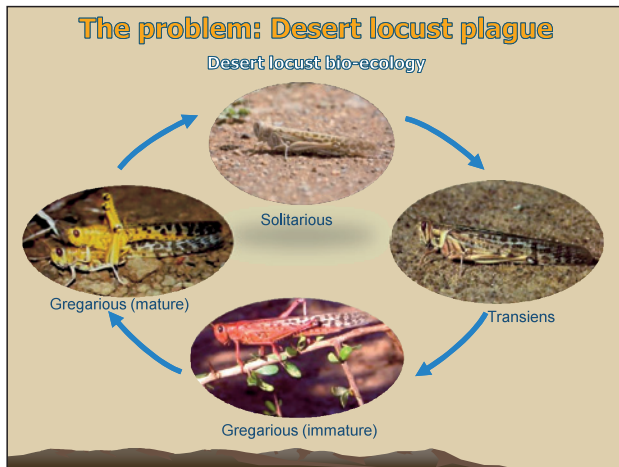
**The problem: Desert locust plague**

**Insect voracious, very mobile, non-predictable and overwhelming**



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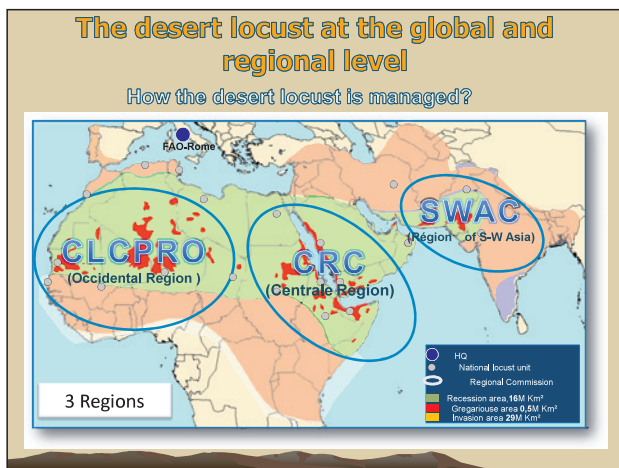




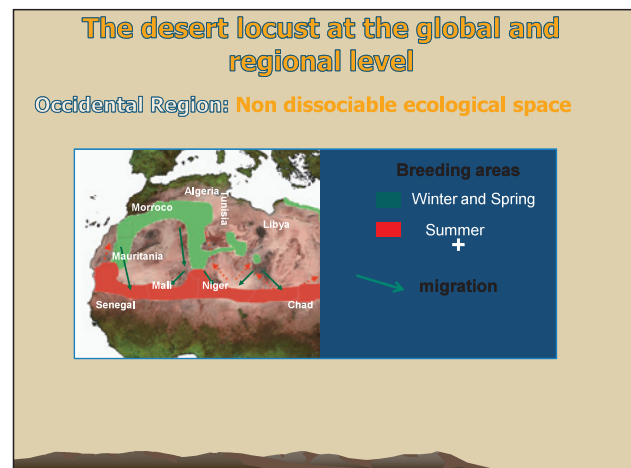
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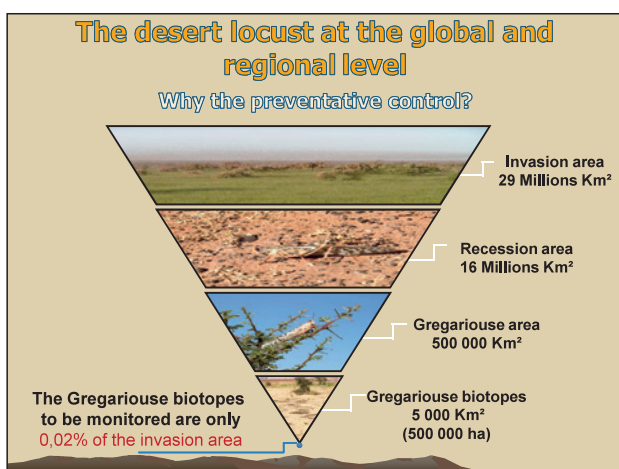
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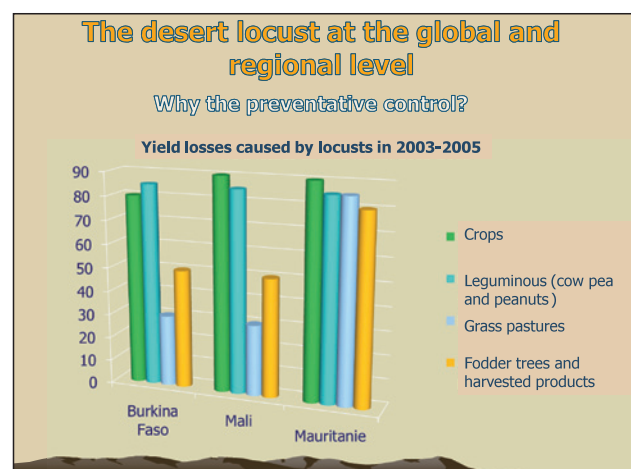
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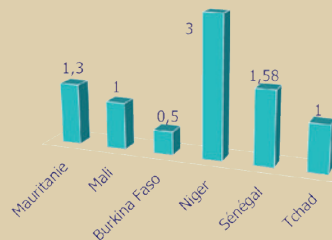


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## The desert locust at the global and regional level

### Why the preventative control?

8 Millions of persons affected in the Sahel( 2003-2005)



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## The desert locust at the global and regional level

### Why the preventative control?

Operations cost  
2003-2005 campaign



570 million US\$

3.3 million US\$ /year

Yearly cost for  
prevention in  
western region:

170 years of preventative control

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## The desert locust in Mauritania

In Mauritania :



• Foyers de gregarisation

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## The desert locust in Mauritania

1. permanent habitat
2. migratory corridor (Sahel-Maghreb-Sahel)



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## Management of the desert locust in Mauritania

### Institutional management

National unit of locust control independent and powerful

Centre National de Lutte Antiacridienne HQ

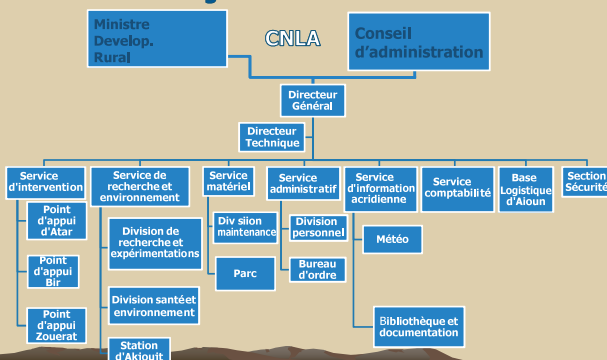


CNLA : Autonomous public institution since 2006

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## Management of the desert locust in Mauritania

### Institutional management



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## Management of the desert locust in Mauritania

### Institutional management

#### Human resources

- Several managers and researchers have been recruited including project staff AELP
- Support staff consists of experienced applicators and drivers, guards etc ....
- The total of staff exceeds 100 persons

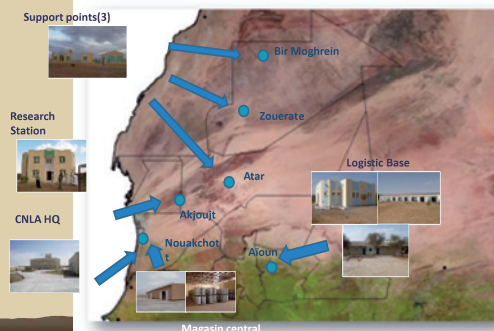


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## Management of the desert locust in Mauritania

### Institutional management

#### Infrastructure



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## Management of the desert locust in Mauritania

### Institutional management

#### Equipment

Responsiveness: sixty vehicles

(6 to 24 teams)



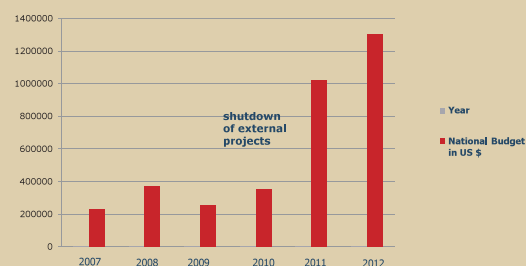
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## Management of the desert locust in Mauritania

### Institutional management

#### CNLA : scalable and sustainable budget

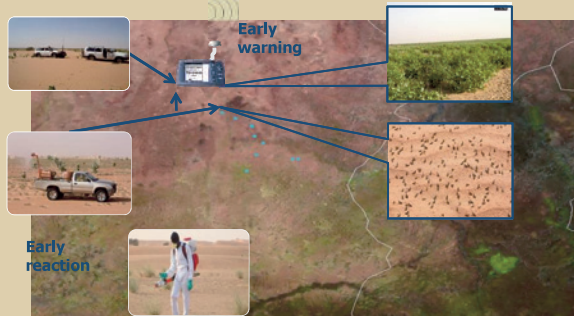
Evolution of the CNLA National Budget



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## Management of the desert locust in Mauritania

### How we do the preventative control?

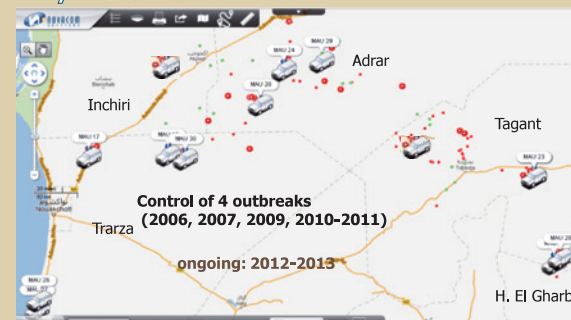


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## Management of the desert locust in Mauritania

### Operational management

#### Survey and control



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**Management of the desert locust in Mauritania**

**Operational management**

Survey and control

Excellent partnership with nomads and farmers For ecological and locust information




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**Management of the desert locust in Mauritania**

**Research and Environment**

Research and capacity building

Green Muscle® Biopesticide improvement



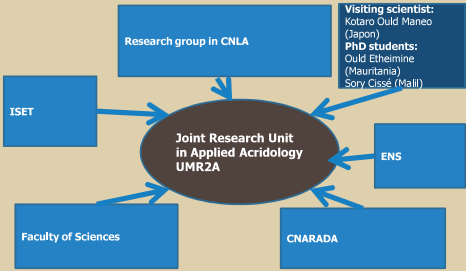
Improved knowledge (biotopes, dynamic Locust)

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**Management of the desert locust in Mauritania**

**Research and Environment**

Research and capacity building



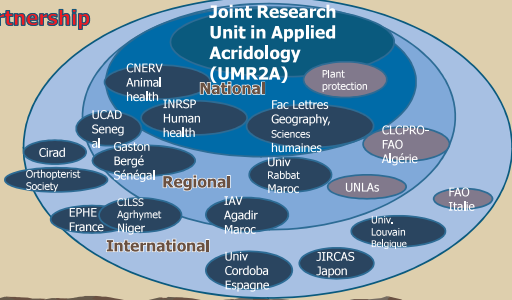
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**Management of the desert locust in Mauritania**

**Research and Environment**

Research and capacity building

**Partnership**



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**Management of the desert locust in Mauritania**

**Research and Environment**

Research and capacity building

•Postgraduate course (2 masters and 2 engineers with support of AELP, FSP, FFM)



•Several national and regional training with the support of FAO/Empres

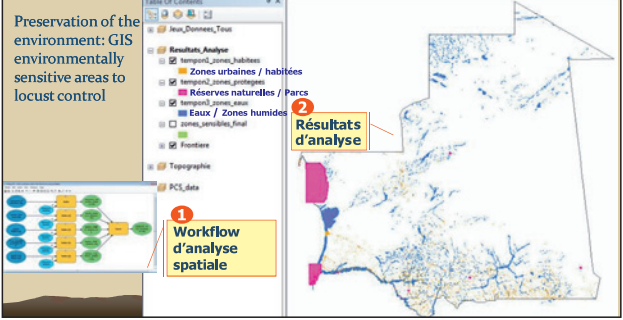
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**Management of the desert locust in Mauritania**

**Research and Environment**

Environment

Preservation of the environment: GIS environmentally sensitive areas to locust control



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### Conclusion and perspectives

- The development made in Mauritania is the fruit of national, regional and international collaboration
- Mauritania holds, however, only a part of the problem since the outbreak areas of the Desert Locust are widely distributed in other countries, which must also develop, in a coordinate manner, their own system for survey and control.
- More international partnership is required to consolidate the existing results and to continue its development particularly through collaborative research

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**Chairman Dr. Kazunobu Toriyama:** Thank you for your presence here again this afternoon. I hope everyone had a good lunch. We now begin Session 4, entitled Risk Recognition and Monitoring System. Although the word *resilience* is not included in the title, this session is very relevant to the topic of resilience, because preventive measures have to be developed and utilized in order to realize resilience. I would like to introduce our first speaker, Dr. Mohamed Abdellahi Ebbe, also known as Ould Babah, the Director General of the National Center for the Prevention and Control of Desert Locusts in Mauritania. He holds a doctorate degree in entomology, and his expertise is in the area of acridology and anti-locust management and control. He has worked in Mauritania for 28 years and served as an international consultant in many African and Arab countries. Dr. Babah, please go ahead.

**Dr. Mohamed Abdellahi Ebbe:** Thank you very much for your kind introduction. Before I enter into my subject I would like to cite a very small but very kind relationship between my country and Japan, which is that I think all Japanese like octopus and the majority of octopus comes from my country. So I wish that this relationship can be sustainable. I think it will be as long as the Japanese like octopus. So I am very happy for this relationship.

Back to my presentation, it will be on desert locust plague in general and where it exists in terms of global and regional levels, and then I will zoom in on Mauritania, an example of one country affected within Africa. Then I will talk about the management of this problem institutionally and from research and environment points of view. Then finally the conclusion and perspectives.

The problem is very old. Yesterday we were talking about resilience, and it is one of the biggest shocks to resilience in more than 60 countries. And it has been for a very long time, more than 3,000 years. It was cited in three holy books in three religions. The main very well-known event is the Eighth Plague of Egypt. Desert locusts have threatened agricultural production in Africa, the Middle East, and Asia for centuries, and still today all over the Sahara and Sub-Sahara. Here you see children running because of the locusts in Dakar in 2004, and also Nouakchott City, the capital of Mauritania was also covered by swarms in 2004.

Since 1880, 80 years of invasions have been recorded, almost two out of three years on average. The problem is that the insect is very voracious, very mobile, non-predictable and overwhelming. One cubic kilometer can contain tens of millions of individuals, each individual weighing about two grams. Each individual can eat its own weight in one day. For one kilometer square of swarm, it was estimated that it can eat the equivalent food of 2,500 people in one day. Its biology has two main phases, solitarious and gregarious, and in between we have transient forms either from solitarious to gregarious or from gregarious to solitarious. Solitarious phase is inoffensive and the gregarious phase is the most harmful.

The desert locust lives in a recession area of 16 million km<sup>2</sup>, the gregarious within only 0.5 million km<sup>2</sup> and it can invade about 29 million km<sup>2</sup>, which covers 60 countries, as I said earlier.

How is the desert locust managed? The mandate of managing this problem was given by the United States in the early 1960s to FAO Rome, where they have an information service and forecasting and also a technical group. They receive information from national locust units in all the African countries and they produce a monthly bulletin based on the information and also alarms for all of area. They have conceived three commissions which are managed by secretaries from FAO staff and supported by the country members. The last one is CLCPRO, which was first only for the Maghreb but recently enlarged to the sahelian countries, in place of an old organization called OCLALAV.

Our commission covers 10 countries, including what we call front-line countries (Chad, Mali, Niger and Mauritania) and Senegal, Burkina Faso and the Maghreb countries. It hosts two main breeding areas, one for winter and spring and one for summer, and there is migration between the various parts of this non-dissociable ecological space within this region.

Why the preventative control? Because the preventative control can concern only 0.02% of the invasion area. We do not need to monitor the 29 km<sup>2</sup> if we properly monitor only 5,000 km<sup>2</sup> in all of the countries; it is enough. We also do this because these locusts can cause very big losses in yield. Here is an example of the last invasion of 2003-2005, when almost 90% of the crops were destroyed in these countries, both for crops, leguminous, grass pastures and fodder trees. Also, within the same impact it was counted that 8 million people were affected in this region: Chad 1 million, Senegal 1.5 million, Burkina Faso 0.5 million, Niger 3 million and Mauritania 1.3 million. Here, if we take the example of Mauritania, we were not able to recover the resilience of these 1.3 million people; we were only able to give help to 400,000. This is to show you how difficult it is to build resilience in the face of this problem.

We also do preventative control because it is less expensive; it is only 1.7% of the cost of an invasion. The last invasion was evaluated at US\$ 570 million in all the affected countries. Instead of this if every year we spend 3.3 million in all the affected countries it is enough to prevent this problem.

Mauritania is 2.7 times the area of Japan, and we have to survey all of this country. It is a permanent habitat and migratory corridor between Sahel, Maghreb and Sahel. It contains three breeding seasons, in the south in the summer, then winter in the north and autumn in the center. So the men have to work nine months out of 12 months continuously in the field.

Since the 1980s we have been building national capacity to face this problem with the help of our regional and international partners, and we have progressed step by step until only a few years ago we developed this national institution which we call the Centre National de Lutte Antiacridienne. The center is composed of about six technical services and many divisions and many supporting points, one field research station and logistical base. It is headed by an autonomous management council and it depends directly from the Ministry of Rural Development.

The human resource is a key aspect of this institutional management. We have several researchers, managers and support staff. The total staff exceeds 100 people.

We have also progressively built infrastructure in the different breeding areas to have logistical support for the team intervening in that area, including this research station in the north and a logistical base in the east, and also one store in the International Standard for Pesticide. Also, this work needs a lot of equipment and responsiveness. We need every time to have vehicles for supporting teams and we therefore have about 60 vehicles. Budget is a key point. In 2010 we had external support and it stopped, in our country, the government took over the responsibility and increased the budget to support the sustainability of the center. This is not very common in our region. If you have heard about alerts on locusts this year, Mauritania has not made any appeal for international assistance despite the fact that we have already controlled 20,000 hectares only through our own resources. So this is a very important point here.

How do we do the preventative control? It is surveying, based of course on all the information in our database built in the last 30 years. We have what is called the biggest database in African affected countries, with more than 60,000 records and more than 400 variables. In addition to that we survey based on the historical itinerary, vegetation green and so on, to detect as early as possible the first infestation of locusts. After that we intervene also, with early reaction, by adapted products to be efficient.

Here, the teams are also sending the information to the headquarters instantaneously through an internet system. It is a technology tool developed by FAO. You see that five outbreaks have been controlled by search teams during the last five years.

In terms of operational management, we have to have an excellent partnership with nomads and farmers for



ecological and locust information, because these nomads are present in the field and we have the same objective: they want pastures and vegetation for camels and we are here to supporting them by preventing damage to their pastures. So the relationship is very strong between us.

Also research capacity building is a very important point, both in bio-pesticide improvement and also development of knowledge in locusts biotypes and dynamics. Here I am happy to show you two people from Japan, and that they are Mr. Nakamura from JIRCAS and a visiting scientist. Again you see visiting scientists. Kotaro may know we call in Mauritania the “samurai of the desert.” He is a very strong man, he shows exactly the culture of samurai Japan, strength, and he is surviving in our harsh conditions and I thank him for that. Also, we are preparing now a research unit in applied acridology, which is under development to have a unit of research recognized and dedicated for research. Our research is very much based on partnerships, on the national and regional levels and international levels, and JIRCAS is also present in this international network, and we hope to continue to develop that relationship.

Training is also very important. We use continuous on-the-spot training but also diploma training and education. Several national and regional training programs have been held with the support of FAO/Empres. Also, many postgraduate courses at international institutions.

Environment is also a key point in our strategy, and here you see a GIS system which shows all the sensitive areas, which should not be controlled by chemicals by the teams. So here you see our two main parks, Banc d’Arguin and Diawling. You see that the rest are either water areas or dams or oasis and all of these are taken with care through our strategies.

In conclusion, the development made in Mauritania is the fruit of national, regional and international collaboration. However, Mauritania holds only a part of the problem since the outbreak areas of the desert locust are widely distributed in other countries, which must also develop, in a coordinated manner, their own systems for survey and control. Between brackets here, yesterday in resilience people were talking about the impact of conflict on resilience. This year, because of the conflict in our neighbor country Mali, we are having more pressure in terms of locusts breeding, coming into Mauritania. So it is also a problem that will have to be considered. Finally, more international partnership is required to consolidate the existing results and to continue its development, particularly through collaborative research. Here, please allow me to make another call for JIRCAS to kindly continue its work with us.

Thank you very much.

**Chairman:** Thank you very much.

I would like to acknowledge Dr. Maeno, who is called the “Locust Samurai” by Dr. Babah, with whom he works. Dr. Maeno, please stand up.

Please give him a big hand. Thank you very much.

Dr. Babah will take questions afterwards.