

BULLETIN D'INFORMATIONS PHYTOSANITAIRES PHYTOSANITARY NEWS BULLETIN



Union Africaine
African Union
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Training Workshop on Capacity building for Management
and Control of Grain Eating Birds (*Quelea quelea*)
in Eastern and Southern Africa Sub Regions



Preparatory Technical Meeting for CPM 6

Global Warming and Climate Change :
Impact on Arthropod Biodiversity, Pest Management, and Food Security

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PHYTOSANITARY NEWS BULLETIN



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SOMMAIRE/CONTENTS

EDITORIAL	3
DESERT LOCUST BRIEFS	4
TRAINING WORKSHOP ON CAPACITY BUILDING FOR MANAGEMENT AND CONTROL OF GRAIN EATING BIRDS (QUELEA QUELEA) IN EASTERN AND SOUTHERN AFRICA SUB REGIONS KHARTOUM-SUDAN	9
REUNION PANAFRICAINE DES POINTS FOCALIS NATIONAUX DU CODEX, 27-29 JANVIER 2011, ACCRA, GHANA	16
PROGRAMME MIXTE FAO/OMS SUR LES NORMES ALIMENTAIRES COMITE FAO/OMS DE COORDINATION POUR L'AFRIQUE DIX-NEUVIÈME SESSION, CENTRE INTERNATIONAL DES CONFÉRENCES D'ACCRA, GHANA, 1-4 FÉVRIER 2011	18
PREPARATORY TECHNICAL MEETING FOR CPM 6 : DOUALA 21-22 FEBRUARY, 2011	21
2012 - 2014 BUDGET PLANING WORKSHOP OUAGADOUGOU, 16-17 MARCH, 2011 AU-IAPSC	26
ATELIER DE PLANIFICATION DES PROGRAMMES BUDGET 2012 OUAGADOUGOU ; BURKINA-FASO DU 16 AU 17 MARS 2011	27
MISSION DU DIRECTEUR DU CPI 20-22 MARS 2011 LIBREVILLE, GABON	29
FIFTH SESSION OF THE COMMISSION ON PHYTOSANITARY MEASURES ROME, ITALY, 22 -26 MARCH 2011 IAPSC	30
GLOBAL WARMING AND CLIMATE CHANGE: IMPACT ON ARTHROPOD BIODIVERSITY, PEST MANAGEMENT, AND FOOD SECURITY	35

**"Ensuring food safety and security — people having
access to an affordable, nutritionally adequate diet, and
African agricultural products accessing international mar-
kets— is vital to meet the Millennium Development Goal of
poverty alleviation in Africa "**

EDITORIAL

Chers lecteurs,

Nous voici en 2011, année charnière pour le Conseil Phytosanitaire Interafricain, mais aussi année au cours de laquelle toutes les synergies africaines sont sollicitées pour propulser le développement du continent. Nous avons des raisons au CPI de penser que le fer de lance de ce développement attendu est notre agriculture. Elle est charnière en ce que c'est l'année de la tenue du Comité de Pilotage et de l'Assemblée Générale du CPI. En effet, tel que prévu par le texte de Maputo, le Comité de Pilotage du CPI se tient chaque année pour analyser les programmes en cours d'exécution et donner des orientations quant aux activités futures. Cette réunion prépare les différents dossiers à soumettre à l'Assemblée Générale qui se tient chaque deux ans et au lendemain de celle du Comité de Pilotage lorsque les deux réunions sont programmées la même année.

Par ailleurs, les objectifs du Programme Détaillé du Développement de l'Agriculture en Afrique (PDDAA), mis en oeuvre par les Communautés Economiques Régionales (CERs) doivent permettre une prise en compte du facteur production agricole qui lui dépend de la protection, de la surveillance, de l'analyse des risques et de la gestion adéquate de l'environnement. Avec la signature des Compacts au sein de chaque CER, le CPI entend accompagner les pays africains dans le renforcement de leurs capacités phytosanitaires axées essentiellement sur l'analyse et la gestion des risques phytosanitaires dont les unités commencent à être implantées dans un grand nombre de pays.

Le CPI, instrument panafricain, est là pour assurer que les aliments et fourrages, productions africaines, sont de bonne qualité et disponibles à tout moment ; que les exploitations des produits agricoles africains améliorent leur conformité aux normes et par conséquent leur compétitivité sur le marché international ; que les politiques et pratiques de protection des végétaux écologiquement acceptables et sans risques pour la santé humaine et animale appliquées en Afrique sont des réalités qui boostent la commercialisation des productions continentales.

La mise en oeuvre de cette politique est contenue dans la stratégie que le CPI a soumise à sa hiérarchie. Les activités à mettre en oeuvre au cours de l'année 2011, conçues à partir des problèmes identifiés dans les pays africains sont les suivantes :

- Analyse spatio-temporelle de la mise à jour de la liste des ravageurs et maladies des plantes en Afrique australe et centrale (SADC et CEEAC) ;
- Renforcement à la conformité aux normes sanitaires et phytosanitaires (SPS) et relèvement des défis pour la commercialisation des produits agricoles des pays africains ;
- Contribution des pays africains à l'identification et à la prévention des mauvaises herbes nuisibles à la sécurité et à la santé alimentaires en Afrique
- Renforcement des capacités des ONPVs au soutien de la mise en oeuvre de la biosécurité dans les pays africains et du cadre d'échange du matériel génétique ;
- Atelier sur l'Harmonisation de l'homologation des pesticides chimiques en Afrique du Nord ;
- Atelier de formation sur la reclassification et la promotion de la Lutte Intégrée contre les mouches de fruits en Afrique de l'Ouest ;
- Renforcement des capacités des ONPVs dans la lutte contre les sauteriaux en Afrique australe ;

Nul doute qu'avec ces différentes activités, l'agriculture africaine, le pouvoir d'achat des Africains et leurs conditions de vie et de santé s'en trouveront considérablement améliorés.



Director

Dear readers,

Here we are in 2011, an important year for the Inter-African Phytosanitary Council, but also the year in which all African synergies are sought to propel the continent's development. We at IAPSC have enough reason to believe that our agriculture will spearhead this much expected development. It is a pivotal year in that it is the year of the holding of IAPSC Steering Committee and General Assembly. Indeed, as spelled out by the Maputo document, IAPSC Steering Committee is held

every year to review programs in progress and provide guidance for future activities. This meeting prepares the various projects for submission to the General Assembly held every two years and the next day after the Steering Committee meeting, when the two meetings are scheduled the same year.

Moreover, the objectives of the Comprehensive Africa Agriculture Development Programme (CAADP), implemented by the Regional Economic Communities (RECs) must permit consideration of the agricultural production factor which in turn depends on the protection, surveillance, risk analysis and suitable management of the environment. With the signing of Compact within each REC, IAPSC intends to assist African countries in strengthening their phytosanitary capacity based primarily on the analysis and pest risk management which units are beginning to be set up in many countries. IAPSC as a pan-african instrument, is there to ensure that food and fodder production in Africa are of good quality and available at any time; that African agricultural products improve their compliance with standards and thus their competitiveness in the international market ; that plant protection policies and practices applied in Africa are environmentally acceptable and safe for human and animal health and thus can the commercialization of our products. The implementation of this policy is contained in the strategy that the IAPSC has submitted to hierarchy for approval. The activities to be implemented during 2011, designed from problems identified in African countries are :

- Spatial and temporal analysis of the updated list of pests and plant diseases in Central and Southern Africa (SADC and ECCAS);
 - Strengthening compliance with international sanitary and phytosanitary (SPS) standards and meeting the commercialization challenges of agricultural products from African countries;
 - African-Contribution to the identification and prevention of noxious weeds to security and food health in Africa;
 - Capacity building of NPPOs to support the implementation of biosafety in African countries and the germplasm exchange framework;
 - Workshop on the Harmonization of the Registration of Chemical Pesticides in North Africa;
 - Training Workshop on the reclassification and promotion of IPM against fruit flies in West Africa;
 - Capacity building of NPPOs in the fight against locusts in Southern Africa;
- No doubt that with these different activities, African agriculture, the purchasing power of Africans and their living conditions and health, will be dramatically improved.

ACTIVITES DU CPI/UA/IAPSC/UA'S ACTIVITIES

Desert Locust briefs (January-March 2011)

Source : fao.org

Important Desert Locust infestations are present in Sudan, Saudi Arabia, Egypt and Mauritania as a result of continued breeding. The most serious infestations have been reported on the Red Sea coast in Saudi Arabia where substantial aerial and ground control operations are underway against hopper bands and swarms. Control operations are also in progress in southeast Egypt. On-going control operations in northwest Mauritania and on the Red Sea coast in Sudan recently began to decline. Smaller scale operations have taken place in southern Morocco and Algeria. More than 40,000 ha were treated in March of which nearly 30,000 ha were in Saudi Arabia.

Elsewhere, low numbers of adults are present in northern Niger, on the Red Sea coast in Yemen, on the northern coast in Oman, and in the spring breeding areas in western Pakistan.

If the remaining infestations in Saudi Arabia are not controlled, new adult groups and small swarms could form on the coast and move into the interior during

April. From early May onwards, there is an increased risk that locusts could cross the Red Sea to Sudan. In Northwest Africa, adults and small groups in northwest Mauritania and southern Morocco could move to the southern side of the Atlas Mountains in Morocco and Algeria and lay eggs.



© F. Sambe Source Le Soleil



Locust situation in March 2011.

ACTIVITES DU CPI/UA/IAPSC/UA'S ACTIVITIES

January. Hatching and hopper band formation on the Red Sea coast in Sudan

The Desert Locust situation remains serious in the winter breeding areas of Sudan. Hatching and hopper bands are forming in the northeast, primarily in Wadi Diib just south of the Egyptian border, and on the central Red Sea coast. Smaller scale breeding is underway in the Tokar Delta. Ground and aerial control operations are in progress.

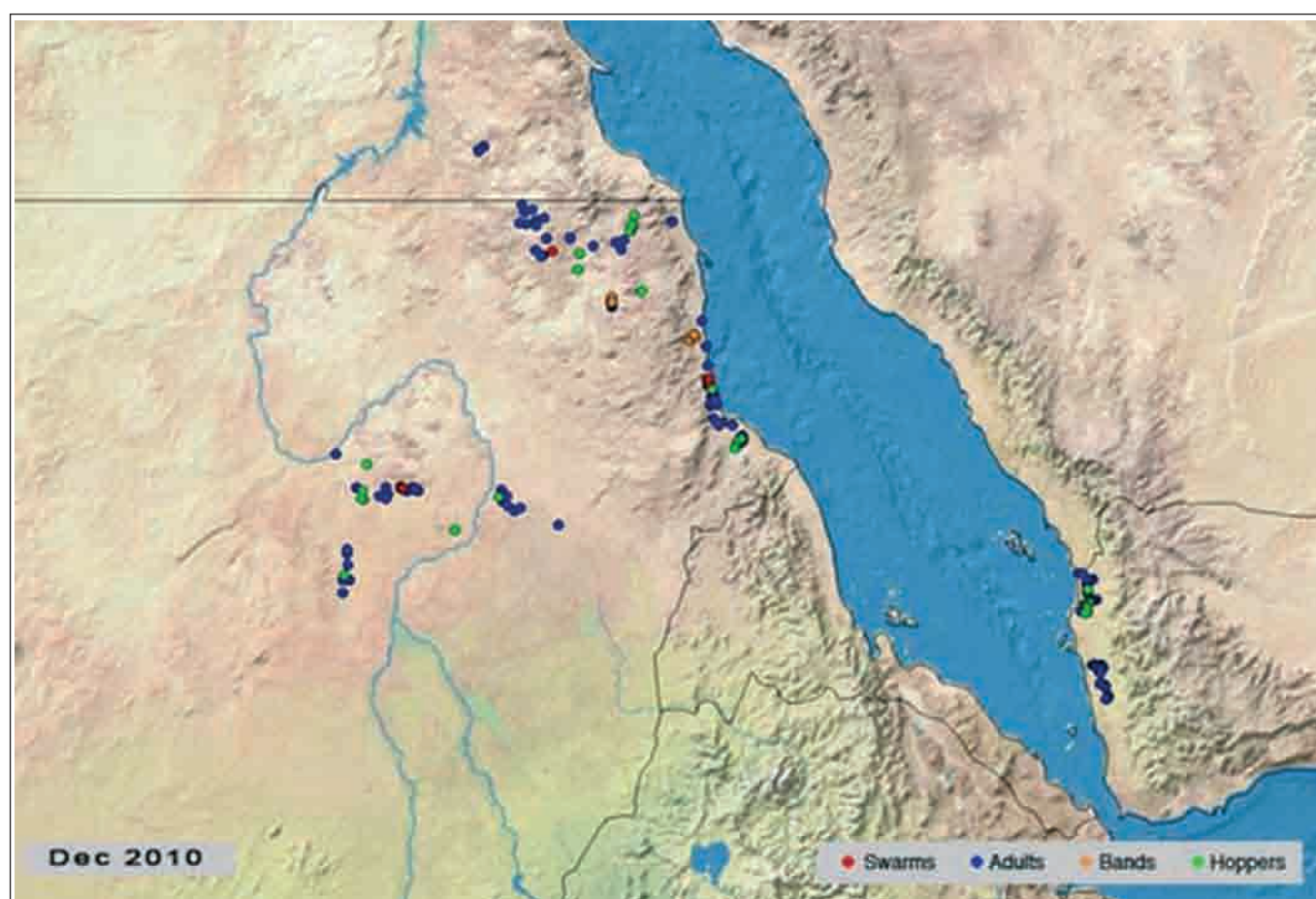
Elsewhere in the winter breeding areas along both sides of the Red Sea, small scale breeding is in progress in southeast Egypt adjacent to the infestations in Sudan. Small hopper groups and bands are forming on the northern Red Sea coast in Yemen and ground

control operations are in progress. Egg laying has occurred along parts of the coast in Saudi Arabia.

Locust numbers will increase during January primarily in Sudan and to a lesser extent in Egypt, Saudi Arabia and Yemen. The situation remains unclear in Eritrea where surveys have not been undertaken.

Small hopper and adult groups are present in north-west Mauritania and limited control operations are underway. Low numbers of adults are present in Western Sahara and Algeria.

Locust infestations declined along both sides of the Indo-Pakistan border as a result of control operations, drying conditions and emigration to the spring breeding areas in western Pakistan.



Locust situation in January 2011.

ACTIVITES DU CPI/UA/IAPSC/UA'S ACTIVITIES

14 January. Aerial and ground control operations in progress on Red Sea coast in Sudan

The Desert Locust situation remains serious in northeast Sudan and has spread into adjacent areas of southeast Egypt.

During the second week of January, a small medium dense swarmlet and groups of mature adults were seen copulating on the Red Sea coast in southeast Egypt near Shalatein. Ground teams treated 100 ha. The infestations are present near the mouth of Wadi Diib which starts in northeast Sudan and drains the western side of the Red Sea Hills. Scattered mature adults are also present on the coast near Halaib and the border of Sudan.

In northeast Sudan, aerial and ground control operations are in progress against hopper bands of all instars

in Wadi Diib/Okol and on the coast between Suakin and Mohamed Qol. Two breeding swarms were also treated on the coast. More than 1,700 ha were sprayed in the first week of January. Groups of solitary and gregarious adults are laying eggs in Wadi Diib and on the central coast. In the Tokar Delta, groups of late instar hoppers and adults are present. Breeding is expected to continue during January in Wadi Diib, on the central coast, and in the Tokar Delta.

Elsewhere, ground teams treated more than 9,000 ha during the first decade of January in northwest Mauritania (Inchiri, Adrar and Dakhlet Nouadhibou regions) where groups of immature and mature adults are present mixed with local concentrations of hoppers. Small-scale breeding will continue during January. Lower numbers of adults are present further north in Tiris Zemmour.



Control operations in NE Sudan.

ACTIVITES DU CPI/UA/IAPSC/UA'S ACTIVITIES

February. Control operations in progress in Sudan, Saudi Arabia and Mauritania

The Desert Locust situation remains serious in the winter breeding areas along the Red Sea coastal plains in Sudan and Saudi Arabia. Hatching has caused locust numbers to increase in both countries and hoppers are forming groups and bands. Aerial and ground control operations are in progress in Sudan and ground control operations are underway in Saudi Arabia. More hatching is expected in both countries in the coming week or so. If current infestations are not controlled, new groups of adults and perhaps a few small swarms will form that could move to the spring breeding areas in the interior of Saudi Arabia. Smaller infestations are present in adjacent areas of southeast Egypt. Local breeding is underway on the Red Sea coast of Yemen where locust numbers remain low.

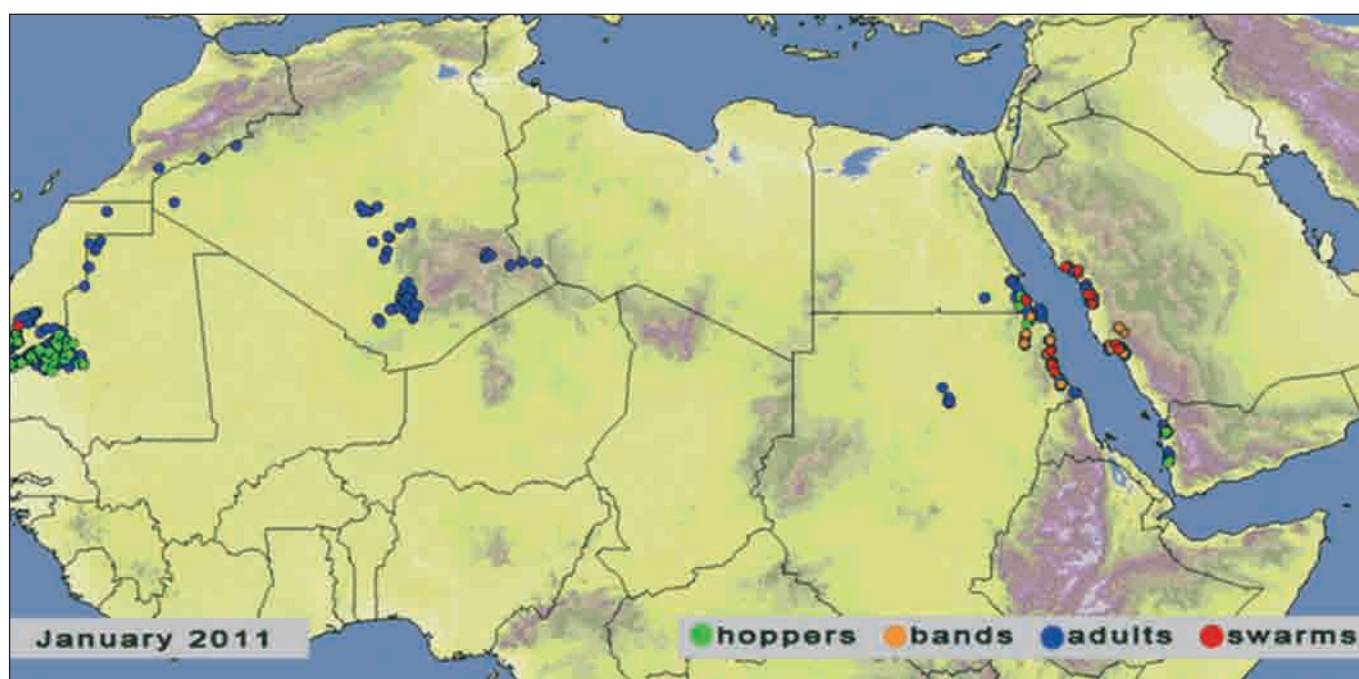
In the Western Region, breeding is continuing in north-west Mauritania and ground control teams are treating groups of hoppers and adults. Some infestations have extended into the southern part of Western Sahara in Morocco. There is a moderate risk that adults and some adult groups will move north to the spring breeding

areas along the southern side of the Atlas Mountains in Morocco and Algeria in the next month or so.

All efforts should continue to monitor the potentially dangerous situation carefully and to undertake control operations as necessary.



© Source. aramel.free.fr



Locust situation in January 2011.

ACTIVITES DU CPI/UA/IAPSC/UA'S ACTIVITIES

March. Control operations continue in Saudi Arabia, Sudan and Mauritania

The Desert Locust situation continues to remain serious in the winter breeding areas along both sides of the Red Sea in Sudan and Saudi Arabia. Ground and aerial control operations are in progress in both countries. In Sudan, teams are treating small hopper and adult groups, hopper bands and adult swarms on the central coast and, to a lesser extent, in the Tokar Delta and in Wadi Oko/Diib. In Saudi Arabia, some 54 teams and two aircraft are involved against hopper bands that formed in February on the Red Sea coast between Qunfidah and Yenbo. Smaller scale ground control was undertaken recently in southeast Egypt.

In Sudan, more hatching is expected during the first half of March. As vegetation dries out, locusts will concentrate and form groups, bands and a few small swarms. There is a moderate risk that a few groups and swarms could appear in the Tokar Delta or cross the Red Sea.

In Saudi Arabia, small groups of adults and swarms will form in March that, if not controlled, are likely to move

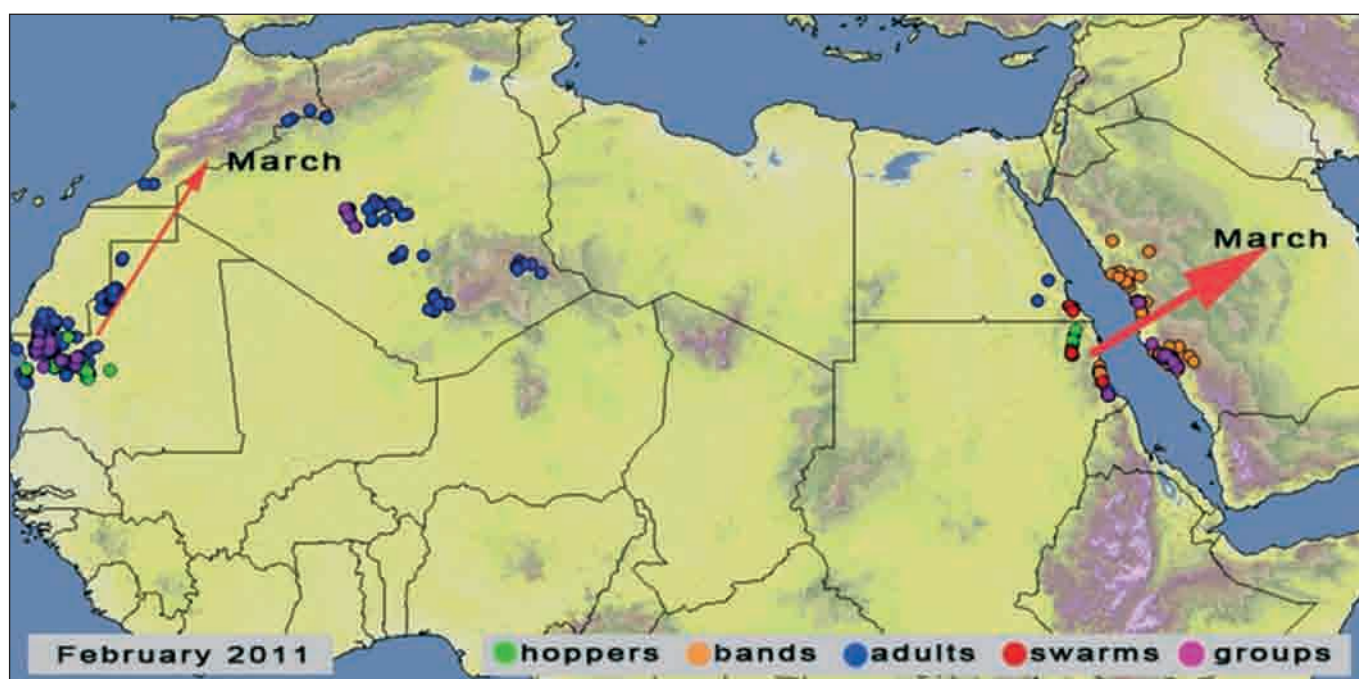
into the spring breeding areas of the interior if no further rains fall on the coast.

The situation is improving in northwest Mauritania due to on-going control operations and drying vegetation. Nevertheless, hatching will continue during the first half of March in parts of Inchiri, Adrar, Dakhlet Nouadhibou, and hoppers and adults are likely to form small groups. There is a low to moderate risk that some groups could reach the spring breeding areas along the southern side of the Atlas Mountains in Morocco in March.



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All efforts are required to control current infestations in order to reduce migration to the spring breeding areas.



Locust situation in February 2011.

ACTIVITES DU CPI/UA/IAPSC/UA'S ACTIVITIES

TRAINING WORKSHOP ON CAPACITY BUILDING FOR MANAGEMENT AND CONTROL OF GRAIN EATING BIRDS (QUELEA QUELEA) IN EASTERN AND SOUTHERN AFRICA SUB REGIONS *06-09 December 2010, Khartoum-Sudan*



Group photo of participants

1- INTRODUCTION

Within the framework of the development of regional strategies for control of the introduction and spread of plant pests and dissemination of safe and sustainable techniques for plant protection, the IAPSC and the Sudanese government organized a sub regional workshop on capacity building of National Plant Protection Organizations (NPPOs) on the grain-eating birds (*Quelea quelea*) management and control. The meeting took place from December 6th to 9th, 2010 in Khartoum-Sudan, bringing together representatives of Plant Protection Organizations of the Eastern and Southern Africa countries.

Hosted in NPPO's conference hall in Khartoum, the Sudanese workshop on *Quelea* birds' management and control witnessed the participation of 6 country representatives out of the 8 invited (appendix 2; list of participants).

2- OPENING CEREMONY

Two speeches marked the ceremony.

2.1- Welcome remarks of the Director of IAPSC

Dr Jean Gerard MEZUI M'ELLA, Director of IAPSC first of all welcomed the participants and thanked the Sudanese officials in the ministry of Agriculture and through them, all the Sudanese people who had spared no effort to facilitate the holding of the workshop in Khartoum. He seized the opportunity to indicate that the global objective of the workshop complied with the International Plant Protection Convention (IPPC), which is an international treaty dealing with plant health, adopted in 1951 by the FAO Conference at its sixth session. Its goal which is also ours, as shown in the organization of the present workshop, is to ensure a common and effective action to prevent the spread and introduction of plant pests and plant products, and promote the adoption of appropriate measures for their control.

He also clarified that IAPSC's concern was and is still to

ACTIVITES DU CPI/UA/IAPSC/UA'S ACTIVITIES

provide countries in the same region a framework for the exchange of experiences among their representatives, to strengthen their capacity to recognize and fight, and especially to create the sub regional information mechanism on the movements of *Quelea* birds for a concerted control. An aim that the establishment of prevention mechanisms (monitoring, tracking, and early intervention) is an important element in the strategy against these pests.

2.2- Opening speech of the Sudanese General Director of Plant health

After thanking IAPSC for having invited the representative of Sudan at the workshop on Traditional techniques of *Quelea* birds control that took place in Douala in January 2010, the General Director of Plant Health, Dr KHIDIR GIBRIL Musa, took the occasion to thank IAPSC for having chosen Khartoum to host this Workshop. Afterwards, he indicated that Grain Eating Birds was the most numerous and destructive bird pest of cereal in Sudan. The situation gets worse because of its large distribution in the country, just as in the sub region, including

inaccessible areas to prospectors and controllers.

The General Director announced that the social and economic impact of *Quelea* birds attack is very high and the main means of control is the chemical control by air.

He called on participants to benefit from the occasion as much as possible and declare open the workshop on capacity building of National Plant Protection Organizations on the management and control of the grain-eating birds (*Quelea quelea*) in Eastern and Southern Africa sub region.

3- Presentations

Under the supervision of Dr Abd El-Fattah Mabrouk Amer, Senior Scientific Secretary Officer as general moderator, the draft agenda submitted by IAPSC was revised and Adopted.

3.1- Background and objectives of the workshop

This presentation of Mr ZAFACK Joseph, Assistant to the Senior Scientific Secretary Officer aimed at highlighting participants on various points as follows below:

• *The Workshop within the IAPSC activities*

According to the speaker, the workshop is an activity of the program named :

Mastering the phenomenon of transboundary pests in Africa. This activity comes within the scope of the development of the regional strategies of the promotion and popularization of the sound and sustainable techniques of plants protection against the introduction and the spread of plant pests and diseases.

• *Background*

It is emerging from the survey conducted in various countries that the migrant pests *Quelea* is the most problematic, covering almost all the agricultural regions at different times of the growing season. In many countries, the pressure of *Quelea quelea* population becomes gradually high from one year to another. For many years, *Quelea* control operations have been undertaken in order to reduce crop losses, but the problem still persists and it is even becoming more and more serious.

From the FAO website, thirty seven African countries are regularly affected by damage caused by Grain Eating Birds.

About the situation of infestation and re-infestation, Mr ZAFACK estimated that it was generally due to the importance that countries of the same sub region give to *Quelea* birds' control. This importance varies according to several factors, including :

- The national political will;
- The status of the *Quelea* birds;
- Access to roosting and/or outbreak areas;

ACTIVITES DU CPI/UA/IAPSC/UA'S ACTIVITIES

- Inadequate technical capabilities for Quelea birds control and
- Lack of control equipment.

• **Global objectives**

The key objective of the workshop is to reinforce the capacities of NPPO as regards comprehension, recognition, detection of the Quelea birds and suitable methods of control. It was also aimed at creating a sub regional network for Quelea birds' information exchange, work plan sharing and activities undertaken.

• **Specific objectives**

- know better the Quelea birds in order to establish

an appropriate control strategy.

- Establish a framework of co-operation between countries of the sub region for concerted control of Quelea birds.

• **prospects**

AU-IAPSC is ready to :

- Follow-up national workshops of restitution of the present meeting.
- Facilitate collaboration between the countries for technical assistance, acquisition of the traditional material of hunting and information exchange.



©AU-IAPSC Participants following or presentation

3.2- Expert's Presentations

3.2.1- Overview on Quelea birds

The presentation of Mr. FOTSO included the following points : Distribution, species and their location, Identification, Feeding, Breeding, Roosting and Migration.

a) Distribution

Quelea bird distribution is confined to Africa South of the Sahara and this presence is associated to

three major geographical zones: grass steppe, dry savannah and mountain-grasslands.

b) Species and their location

In Africa a census on 3 main quelea species was made.

1. *Quelea quelea* (Red-billed quelea)
2. *Quelea erythrops* (Red-headed quelea)
3. *Quelea cardinalis* (Cardinal quelea)

The first one is the most economically important.

ACTIVITES DU CPI/UA/IAPSC/UA'S ACTIVITIES

Five subspecies assumed as geographical races, are distributed as follows :

1. *Q.q.quelea*: western Africa;
2. *Q.q.aethiopica*: Sudan, E'thiopia, northern Somalia;
3. *Q.q.intermedia*: Southern Somalia, Kenya, Tanzania;
4. *Q.q.lathamii*: Southern Africa;
5. *Q.q.centralis*: Western Uganda, Western Tanzania, Rwanda et Burundi.

c) Identification

After presenting the difference in appearance between male and female in their breeding period, Mr FOTSO specified that the non Breeding quelea have similar plumage to the breeding female, but both sex have a pink red bill. Juvenile quelea are similar to non breeding female, but their plumage is a fresh-looking one.

d) Feeding

Quelea birds mainly depend on wild grass. (sorghum sp., Oriza sp., Echinochloa sp., Panicum sp. and Urochloa sp.) and sorghum (*Sorghum vulgare*) as their food source throughout the year. They also live on insects, especially during the breeding season for the feeding purpose of the nestlings during their first few days of life, together with seeds at their milky stage. These insects include grasshoppers, nymphs, caterpillars, small beetle and winged termites. Quelea needs 3-4 g seeds per day.

e) Breeding

The breeding time depends on the occurrence of high quality food, which is used for the feeding of their young. Such conditions are available during the wet season after 4-9 weeks rain.

Breeding colonies vary in size, ranging from one to

a few hundred hectares.

Quelea are monogamous, with a clutch size of three whitish-blue eggs.

They start breeding at 9-12 months and at least one breeding attempt is made in a year. But under optimal ecological conditions, quelea is expected to breed three times a year. The incubation of eggs is shared by both sex and takes a period of 10-12 days

f) Roosting

At the end of the breeding season, Quelea typically assembles in roosting sites in Acacia or reeds besides water sources. They roost in large numbers estimated to be hundreds of thousands or millions. The size and number of birds in a roost depends largely on the availability of food and water in the area around. The main roosts are occupied only during the night. During the hot hours of the day, they roost in small numbers near water sources, what is known as day roosts. They feed intensively during early morning and late afternoon.

g) Migration

Quelea migration patterns are complex and brought about by the changes in seeds availability. As such, Quelea has to migrate elsewhere to avoid starvation.

They fly across the rain to areas where it has been raining previously and grass seeds are already growing.

3.2.2- Seasonal and Daily Movements of Quelea Birds

After having recognized Grain Eating Birds as a migrant pest, Mr Gizachew Assefa from Ethiopia defined migration as a regular seasonal movement of

ACTIVITES DU CPI/UA/IAPSC/UA'S ACTIVITIES

birds from one place or habitat to the other. Quelea birds migrate in response to changes in the availability of their principal food, the seed of annual grass.

Seasonal movements of Quelea Birds depends on how fast the rain front traversed the region. In Eastern Africa, the rain front moves more rapidly southwards across the equator. The distance covered by the species *Q. intermedia* may be as much as 1200km.

In Southern Africa, the rain front moves north west at an intermediate rate, The distance covered by *Q. lathamii* is about 550 km.

a) Quelea Movements in Eastern Africa

Fingerprint information suggests quelea found in the central rift (Nakuru, nanuyuki) and northern Kenya are more closely aligned to those from southern Ethiopia. Quelea in northern Somalia have similar mask indices to those from the Awash River Basin of Ethiopia. These evidences suggest that there is quelea movement between Ethiopia - Kenya and Ethiopia - Somalia.

There is also a possible connection with southern Sudan and eastern Uganda.

According to Ward with Onset of the short rains in Tanzania in November, quelea migrate to the north east into southern Somalia where the rains begin several weeks earlier. With favorable rainfall, most quelea return to the south after a few weeks and nest in southern Kenya in December – January; and again in central Tanzania in February – March. Breeding gradually progresses northwards in May /June.

b) Daily movements of Quelea birds

Quelea can travel up to 30- 50 km from and to the roosting site during the none bring season. (up to 100 km. every day). Flocks leave roosts / nesting

sites at day break / 6:00 am./ for the feeding grounds. They feed until 10:am in the morning and move to a loafing place / day roost during the hot time of the day. They return to the feeding grounds again and feed until about sunset. They then settle at the night roost at about sun set (6:00pm.).

Quelea travel shorter distance during the breeding seasons (not more than 5 km).

Movements between the feeding grounds and the nesting sites are frequent throughout the day.

Factors affecting daily movements :

The availability of food, water, weather condition (cloud cover, rain, cold weather), nesting conditions (nesting colonies cover short distance)

3.3- Speaking as an expert,

Mrs Fatima Mohamed ElAmin, Sudanese Head of Vertebrate Pests Section defined Quelea birds as the most numerous and destructive bird pest of cereal crops (Millet, Sorghum, Rice, Barley, Oat and Sunflower) in Africa and affects cereal production in more than 25 countries. She also said that the introduction of mechanized farming, coupled with the intensification and diversification of crop production, has modified many natural grass habitats. As a result, bird colonies are found in close proximity to crop fields and serious crop damage has been occurring. The main means of control in Sudan is the method of aerial spray of chemical products.

3.4- Country presentations

From the country presentations, it appears that all countries present at the workshop (See appendix 2) suffer from attacks to crops by three major migratory pests, namely Quelea birds, Locust and Armyworms. The magnitude of Quelea birds' attacks is high, and therefore requires a particular strategy for control, unlike other pests. Crop losses caused by this pest in these countries affect the food security leading to human suffering.



ACTIVITES DU CPI/UA/IAPSC/UA'S ACTIVITIES

It was pleasant to know that many countries' Government recognize Quelea birds as harmful pest and various control methods are developing. *Areal spraying of avicides, vehicle mounted ground spray, blasting use explosives, scaring.*

Many challenges have been presented by the representatives of countries and summarized in this report as participants' recommendations.

3.5- Traditional method of Quelea Birds control

Presented by Mr. ZAFACK Joseph, traditional method of Quelea Birds control was recommended by NPPOs during the 20e General Assembly of IAPSC on 2002 at Yamoussoukro-Ivory Coast. Indeed, it was recommended to IAPSC to search for and promote chemical alternative methods of pests' control. After a series of investigation in Chad, Botswana, Sudan, Mali, Cameroon, Niger and lastly Angola, various traditional techniques for protecting cereal crops from Grain Eating Birds were identified.

These techniques were divided into six following categories :

- Large-scale Capture Techniques
 - the *Hadjarai* technique
 - Massa* technique
- Small-scale capture
 - the *Djoh* Net technique
- Mechanical Destruction of Nests

- Repellent techniques
- Agronomic and
- Environmental techniques.

According to Mr ZAFACK, while considering the bomb (explosives) techniques and chemical spraying by air and vehicle as the appropriate means of control in a situation of full-scale invasion, the traditional techniques of Quelea birds control should be popularized in order to delay the formation of large flocks and maintain as long as possible the bird population below the threshold for harm.

4- RESULTS

- Improvement of the knowledge on grain eating birds' behaviour
- Strengthening of the technical capabilities, necessary to locate the dormitories and nestlings, in order to set up a more suitable control system.
- Establishment of network of information exchange on the Quelea birds movements between neighbouring villages and towns. This enables them to prepare a more objective work program on Grain Eating Birds control.
- Friendly management strategies to reduce the Grain Eating Birds pressure, respectful of human and animal health and the environment.
- Better understanding of the principle of sub regional information.



Exchange on grain eating birds programs and activities.

ACTIVITES DU CPI/UA/IAPSC/UA'S ACTIVITIES

5- PARTICIPANTS' RECOMMENDATIONS.

1. IAPSC should coordinate the development of a web-site where countries can share information. Countries should be able to access and load information on the web. Management and its authority will remain an AU entity.

2. A secretariat from IASPC should be formed to collaborate with other regional bodies involved in migrant pest control like DLCO-EA, ICO-SAMP, IRLCO-CSA, OCLALAV and others. Their representation should be in all IAPSC forums and resourceful if possible voluntary.

3. Improvement and promotion of traditional control methods to be priority number one. This will involve harvesting of birds, processing packing and promotion to consumer societies. IAPSC should support financing and data collection.

4. All NPPOS have identified several challenges including financial constraints on the on-going control systems; these include: capacity building in terms of equipment and knowledge, IAPSC should develop a sustainable complimentary programme to cater for these challenges and assist to seek financiers.

5. IAPSC should lead to advocate to International Organizations and AU governments to address with priority the Quelea control as a regional threat to food security so as to include more countries aboard regional organizations.

6. It is necessary to continue emphasizing on Environmental Impact assessment of Quelea control by avicides on other crops and wetlands (Irrigated crops and riverbanks).



ACTIVITES DU CPI/UA/IAPSC/UA'S ACTIVITIES

REUNION PANAFRINAINE DES POINTS FOCaux NATIONaux DU CODEX, 27-29 JANVIER 2011, ACCRA, GHANA

La 2^e réunion des Points de Contact Nationaux du Codex s'est tenue du 27 au 29 janvier 2011 à Accra (Ghana). Le Directeur de l'UA-BIRA et le Coordonnateur de CCAFRICA en étaient les organisateurs. La réunion avait pour objectif général de faciliter la participation effective des Etats membres de l'Union Africaine aux activités de la Commission du Codex Alimentarius au cours de l'élaboration des normes internationales sur la sécurité sanitaire des aliments, en veillant à une préparation appropriée et à une bonne coordination des positions des pays/régions. La réunion allait en droite ligne des objectifs du plan stratégique de CCAFRICA dont les suivants :

1. Rassembler les points de vue nationaux et élaborer les positions régionales sur les questions d'intérêt pour les Etats membres, lesquelles questions sont en cours de discussion au sein de la Commission du Codex Alimentarius (CAC) ;

2. Sensibiliser les fonctionnaires Points Focaux Nationaux sur le projet des normes du Codex en cours d'élaboration par divers comités du Codex en vue de leur permettre de commencer au niveau national des consultations sur ces normes ;

3. Promouvoir la mise en place, le renforcement des Points de Contact du Codex et des membres des Comités Nationaux du Codex de la région Afrique.

4. Créer un forum d'échange d'information sur les questions relatives à la sécurité sanitaire des aliments d'intérêt pour la région Afrique.

Les objectifs spécifiques étaient les suivants :

1. Favoriser une communication effective et dynamique entre les membres du CCAFRICA et les au-

tres régions, les autres membres du Codex, le Secrétariat du Codex et les organismes compétents.

2. Obtenir une efficacité et une participation active de tous les pays de la région dans les activités de la Commission du Codex Alimentarius, ainsi que dans ses organes subsidiaires, en particulier la CCAFRICA.

3. Mettre en place des groupes de travail chargés d'examiner les aspects stratégiques des activités du Codex.

4. Mettre en place un calendrier de sessions conjointes avec CCAFRICA, des séminaires/ateliers sur la sécurité alimentaire et des sujets d'intérêt pour la région.

5. Encourager les pays qui ont un intérêt commun à coordonner leurs positions et à les soumettre en tant que position commune aux réunions du Codex Alimentarius.

6. Identifier et hiérarchiser les questions qui exigent une expertise particulière portant sur la sécurité alimentaire.

II- DEROULEMENT DE LA REUNION

Les participants étaient des fonctionnaires Points de Contact du Codex au sein de la région Afrique. Ils étaient assistés des experts de plusieurs pays membres ayant participé aux sessions du Codex. Ces derniers ont fait des présentations sur divers projets des normes et d'autres sujets d'importance pour la région. Les Points de Contact du Codex ont été sollicités pour la prise des notes sur ces différentes questions

ACTIVITES DU CPI/UA/IAPSC/UA'S ACTIVITIES

pour discussions et consultations sur le plan national en vue de rassembler les données ou les informations au niveau national. Les données rassemblées sur les différents projets de normes seront analysées lors des réunions des experts de la CCAFRICA pour former une base des positions africaines. Au cours de la réunion des Points de Contact Nationaux du Codex, il ya eu également des réunions parallèles d'experts sur les contaminants dans les aliments et les résidus de pesticides. Les résultats des réunions des experts ont été débattus le dernier jour de la réunion des Points de Contact Nationaux pour le Codex pour intégrer les résultats et les commentaires des fonctionnaires en vue d'élaborer un document final qui sera présenté en tant que position africaine. Le document sur la position finale sera communiqué à tous les pays membres de la CCAFRICA.

III- RESULTATS OBTENUS

A la fin de la réunion des Points de Contact Nationaux du Codex, les résultats suivants ont été obtenus :

- Les fonctionnaires qui sont les Points de Contact ont été sensibilisés sur les questions actuelles d'intérêt pour la région Afrique ;
- Les positions régionales recommandées ont été adoptées en ce qui concerne le projet des normes à discuter lors de la 5^e session des Comités du Codex sur les Contaminants dans les aliments du 21 au 25 mars 2011 et lors de la 43^e session du Comité du Codex sur les résidus des pesticides du 4 au 9 avril 2011.
- L' UA-CPI devra réunir chaque année la réunion des Comités sur les Résidus des Pesticides afin d'harmoniser les positions nationales et par conséquent de produire un document unique sur la position africaine.

Les

objectifs spécifiques étaient les suivants :

- 1. Favoriser une communication effective et dynamique entre les membres du CCAFRICA et les autres régions, les autres membres du Codex, le Secrétariat du Codex et les organismes compétents.*
- 2. Obtenir une efficacité et une participation active de tous les pays de la région dans les activités de la Commission du Codex Alimentarius, ainsi que dans ses organes subsidiaires, en particulier la CCAFRICA.*
- 3. Mettre en place des groupes de travail chargés d'examiner les aspects stratégiques des activités du Codex.*
- 4. Mettre en place un calendrier de sessions conjointes avec CCAFRICA, des séminaires/ateliers sur la sécurité alimentaire et des sujets d'intérêt pour la région.*
- 5. Encourager les pays qui ont un intérêt commun à coordonner leurs positions et à les soumettre en tant que position commune aux réunions du Codex Alimentarius.*

ACTIVITES DU CPI/UA/IAPSC/UA'S ACTIVITIES

PROGRAMME MIXTE FAO/OMS SUR LES NORMES ALIMENTAIRES COMITE FAO/OMS DE COORDINATION POUR L'AFRIQUE Dix-neuvième session, Centre International des conférences d'Accra Accra, Ghana, 1-4 février 2011

Le Comité FAO/OMS de coordination pour l'Afrique a tenu sa dix-neuvième session à Accra (Ghana) du 1^{er} au 4 février 2011, à l'aimable invitation du gouvernement ghanéen. La session a été présidée par M. Samuel Sefa Dedeh, Doyen de la Faculté des Sciences de l'ingénierie de l'Université de Ghana Legon.

Ont assisté à la session des délégués, conseillers et observateurs représentants des Etats membres, des membres ayant statut d'observateurs extérieurs à la région et des organisations internationales. La liste complète des participants, y compris le personnel du Secrétariat et les représentants de la FAO et de l'OMS, est jointe au présent rapport.

I- OUVERTURE DE LA SESSION

La session a été ouverte par M. Joseph Yileh Chireh, Ministre de la Santé, au nom de M. John Dramani Mahama, Vice-Président de la République du Ghana, qui a souhaité la bienvenue aux participants à la dix-neuvième session du Comité de coordination du Codex pour l'Afrique (CCAFRICA) et a fait observer que la session offrait une occasion unique de s'attaquer aux problèmes auxquels le continent était confronté dans le domaine de la sécurité sanitaire des aliments. Il a noté par ailleurs qu'en dépit des efforts déployés par les gouvernements et les institutions multilatérales et bilatérales, les systèmes nationaux de contrôle des aliments présentaient toujours des faiblesses en Afrique, et a souligné qu'il y allait de la responsabilité commune et de la participation de toutes les parties prenantes. Il a fait re-

marquer que pour améliorer la sécurité sanitaire des aliments dans la région, les gouvernements et les organismes donateurs devaient allouer davantage de ressources financières aux activités du CCAFRICA afin de garantir de réelles avancées et qu'il était nécessaire que les gouvernements et les organismes africains montrent leur engagement en appuyant les activités du Codex à l'échelon national. Il a également souligné que les activités de la Commission du Codex Alimentarius évoluaient et que l'Afrique ne pouvait pas se permettre de prendre du retard. M. Joseph Yileh Chireh a enfin félicité le Bureau Interafricain pour les Ressources Animales de l'Union Africaine (UA-BIRA) pour sa contribution à la coordination des positions africaines sur certaines questions liées au Codex. Pour conclure, M. Joseph Yileh Chireh a noté qu'à sa prochaine session, le CCAFRICA aurait un nouveau coordonnateur, rôle que le Ghana était honoré de remplir pour la présente session. Il a indiqué que la coopération de divers Etats membres avait redonné de l'élan aux efforts déployés pour amener le CCAFRICA à son niveau actuel, que la région était à un moment décisif de son histoire et qu'il était impératif que le prochain coordonnateur prenne des initiatives éclairées. Mme Hannah Clarendon et M. Daniel Kertesz ont souhaité la bienvenue aux délégués au nom de l'Organisation des Nations Unies pour l'Alimentation et l'Agriculture (FAO) et de l'Organisation Mondiale de la Santé (OMS) respectivement.

ACTIVITES DU CPI/UA/IAPSC/UA'S ACTIVITIES

II-DEROULEMENT DES TRAVAUX

Après adoption de l'ordre du jour, la réunion a examiné les questions soumises par la Commission du Codex Alimentarius lors de ses trente-deuxième et trente-troisième

sessions, par le Comité Exécutif du Codex Alimentarius à sa soixante-quatrième session et par le Comité du Codex sur les principes généraux à sa vingt-sixième session, dont un résumé a été donné dans le document de travail. Il s'est

penché en particulier sur les points suivants :

- traçabilité/traçage des produits
- les normes privées et leur respect par les producteurs/transformateurs de denrées alimentaires dans les pays ;
- les conséquences financières de l'application des normes privées pour les PME ;
- les mesures à prendre pour surmonter/atténuer les problèmes posés par l'application des normes privées ;
- la nécessité pour la commission de favoriser la coordination avec les organismes de normalisation privés en créant un groupe de travail afin d'examiner les questions soulevées par l'impact des normes privées ;

II-1 Examen du plan stratégique du Comité du Codex pour la période 2008 - 2013

Le Comité a noté que plusieurs pays avaient établi des mécanismes pour promouvoir la coordination interdisciplinaire au niveau national et renforcer la participation des ONG au niveau national.

II-2 Elaboration d'un nouveau Plan Stratégique pour 2013 - 2018

Le Comité a examiné les questions soulevées dans

le cadre de la lettre circulaire CL 2010/43-AFRICA, en vue de l'élaboration du Plan Stratégique révisé, et a formulé certaines observations et recommandations.

II.3 Activités de la FAO et de l'OMS complétant les travaux de la Commission du Codex Alimentarius.

Le représentant de la FAO a présenté les nouvelles orientations concernant les programmes de contrôle des importations alimentaires, le lancement du programme EMPRES-sécurité sanitaire des aliments et assistance technique pour une gestion améliorée des situations d'urgence dans le domaine de la sécurité sanitaire des aliments au niveau national, l'investissement dans les programmes de contrôle des aliments ainsi que leur référencement. Le représentant a donné des précisions sur le soutien technique dont les membres peuvent bénéficier, dont le renforcement des capacités des comités nationaux du Codex, la mise en place des systèmes de contrôle des aliments fondés sur le risque et l'amélioration des services techniques en rapport avec le contrôle des aliments, le soutien à certaines chaînes de valeur afin de permettre la mise en œuvre de normes du Codex, et le renforcement du partage des informations relatives aux mesures SPS et aux normes alimentaires entre parties prenantes.

Le représentant de l'OMS a rappelé au Comité que les avis scientifiques fournis par la FAO et l'OMS jouaient un rôle primordial non seulement dans l'élaboration des normes de sécurité sanitaires du Codex, mais aussi dans le processus décisionnel aux niveaux national et régional. Les produits du programme d'avis scientifiques sont librement accessibles sur les sites web de la FAO et de l'OMS, et des efforts sont entrepris pour améliorer leur accessibilité.

ACTIVITES DU CPI/UA/IAPSC/UA'S ACTIVITIES

III-PROJET ET FONDS FIDUCIAIRE FAO/OMS A L'APPUI D'UNE PARTICIPATION RENFORCEE AU CODEX

Le représentant de l'OMS a présenté ce point en rappelant que la commission à sa trente-troisième session, et le Comité Exécutif à sa soixante-quatrième session, s'étaient prononcés sur cinq questions stratégiques dans le cadre de l'évaluation à mi-parcours du Fonds Fiduciaire du Codex.

D'autres points de l'ordre du jour ont été discutés et les détails présentés dans le rapport circonstancié produit et présenté en annexe du présent rapport.

IV- NOMINATION DU COORDONNATEUR

Sur proposition de la délégation tanzanienne, et

avec le soutien d'autres délégations, le Comité a convenu à l'unanimité de recommander à la Commission du Codex Alimentarius de nommer, à sa trente-quatrième session, le Cameroun en qualité de coordonnateur pour l'Afrique. La délégation camerounaise a accepté la nomination et remercié le Comité pour son soutien. La délégation s'est engagée à prendre le relai des travaux menés par le Ghana dans le cadre du Plan stratégique pour le CCAFRICA.

V- DATE ET LIEU DE LA PROCHAINE REUNION

Le Comité de coordination a été informé que sa vingtième session se tiendrait dans environ deux ans (2013) et que la date et le lieu exacts de cette réunion seraient communiqués aux membres plus tard, après consultation entre le Coordonnateur et le Secrétariat du Codex.

Le représentant a donné des précisions sur le soutien technique dont les membres peuvent bénéficier, dont le renforcement des capacités des comités nationaux du Codex, la mise en place des systèmes de contrôle des aliments fondés sur le risque et l'amélioration des services techniques en rapport avec le contrôle des aliments, le soutien à certaines chaînes de valeur afin de permettre la mise en œuvre de normes du Codex, et le renforcement du partage des informations relatives aux mesures SPS et aux normes alimentaires entre parties prenantes.

ACTIVITES DU CPI/UA/IAPSC/UA'S ACTIVITIES

PREPARATORY TECHNICAL MEETING FOR CPM 6 : DOUALA 21-22 FEBRUARY, 2011



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1- Introduction

The Participation of African Nations in Sanitary and Phytosanitary standards-Setting organizations project (PAN-SPSO) was established as a joint collaboration between the European Commission (EC) and the African Caribbean Pacific Group of States (ACP), on behalf of African Regional Economic Communities (RECs). The project is specifically aimed at improving the efficiency of the participation of African countries in the activities of the Codex Alimentarius Commission, OIE, and IPPC during the formulation of international standards on food safety, animal and plant health through the services of the African Union Inter-African Bureau for Animal Resources (AU/IBAR) (project Regional Authorizing Officer (RAO)) and the Inter-African Phytosanitary Council (AU-IAPSC).

The project has provided funds for panafrikan consultations on draft ISPMs since 2009. It was expected that the number of countries submitting comments to IPPC Secretariat would increase. This hasn't happened for Africa.

In fact, only 5 countries out of 31 represented in the regional workshop held in Lusaka in 2010, sent comments. In addition it has been noted that positions of African countries at CPM meetings are not coordinated.

Taking all these issues into account, a mechanism for building a common position on plant health issues was proposed. The mechanism includes technical meetings at critical steps, continental NPPOs meeting as well as continuous electronic fora / e-mails.

The preparatory meeting held in Douala on 21-22 February 2011 aimed at achieving common positions for CPM since this step is considered critical in the standards setting process. Due to funds limitations, only participants from 8 selected National Plant Protection Organizations (Mali, Nigeria, Cameroon, DR Congo, Mozambique, Kenya, Tanzania, Morocco) were invited to the meeting. Attendance in the previous CPM meeting and balance among RECs served as criteria for selection.

ACTIVITES DU CPI/UA/IAPSC/UA'S ACTIVITIES

The workshop was facilitated by 2 Standards Committee members.

2. Objectives and expected outputs of the preparatory meeting.

The overall objective of the meeting was to assist countries in preparing African positions on the various items on the CPM6 agenda.

Its specific objectives were :

- Analyze the final drafts ISPMs submitted for adoption;
- Improve the coordination of countries' participation at continental level;
- Provide the opportunity to benefit from explanations regarding the background and content of documents on the CPM6 agenda;

The expected outputs included :

Substantive comments on ISPMs are made for use by African delegates at CPM6;

Common positions adopted and roles during CPM6 are distributed;

Better understanding is gained and more possibilities are given for input into the topics and priorities for standards already on the work program and for future standards;

Comments on various items on the agenda of CPM 6 are provided to African participants to better prepare themselves for the meeting.

3. Opening ceremony

This session was marked by four speeches:

- Raphael Coly, PANSPSO Coordinator remarks;
- Opening remarks by Hannah Clarendon, FAO Regional Crop Protection Officer;
- Welcome speech by Jean Ge'rrard Mezui M'Ella, Director of AU-IAPSC and
- Opening speech by Marcel Bakak representing the Director of the Cameroonian NPPO.

They all put emphasis on the importance of achieving common positions in CPM meetings as the ultimate step for standards adoption. They also urged countries to comment on standards and to participate in various steps of standards setting process.

4. Review and adoption of the agenda

The proposed agenda was an extract from the provisional agenda of CPM6. For this meeting, more emphasis was put on the standards.

Thus, the adopted agenda (Appendix 1) comprises various items including :

- International standard setting and implementation programme: regular process;
- International standard setting and implementation programme: special process;
- Standard setting topics and priorities;
- Phytosanitary capacity development projects and activities databases;
- Implementation of the IPPC;
- Phytosanitary capacity development Strategy for Africa.

5. International standard setting and implementation program: regular process

The three draft standards to be submitted to CPM6 for adoption were discussed: Fruit fly trapping (appendix to ISPM 26); Phytosanitary certification system (ISPM 7); Phytosanitary certificates (ISPM 12).

For each draft ISPM, there were presentations of various countries' comments submitted to IPPC and a presentation of the standards itself. This was followed by discussions during which comments, corrections for inclusion on the templates were made. It should be noted that at this step, only substantive comments were to be submitted according to the standards setting procedure.

a. Fruit fly trapping (appendix to ISPM 26) :

Identification of fruitflies species is on-going. It is therefore important that in the first paragraph of the appendix, a new provision be inserted to allow update of the list as new species are identified.

Discussions were also made on the use of the term "commonly used" attractants. At the end of the discussions, it was suggested to use the term "currently used" instead of "commonly used" to reflect the realities that many contracting parties are not using the attractants or do not have access to some of them.

It was also proposed that IPPC continues to look for cheaper alternatives that are readily available.

ACTIVITES DU CPI/UA/IAPSC/UA'S ACTIVITIES

b. Phytosanitary certification system (ISPM 7); Phytosanitary certificates (ISPM 12).

Though there have been no substantive comments on the two drafts standards, a lot of discussions were made especially on the NPPOs' responsibilities, since in some cases, the issuing authority is not under the NPPO responsibility. It was recalled that according to IPPC, the NPPO should have the sole authority to undertake phytosanitary certification. In some situations, a non-government personnel or an office different from the NPPO may carry out specific certification functions but this must be authorized by the NPPO.

6. International standard setting and implementation programme: special process :

Irradiation treatment for *Cylas formicarius elegantulus*, *Euscepes postfasciatus* and *Ceratitis capitata*.

Participants discussed the equipment and staff qualification needed for the implementation of these treatments. It was noted that except for some countries (Egypt, South Africa, ...) most countries don't have the required capacities.

It was therefore agreed to submit the following comment: African countries found these treatments relevant but agreed that because of lack of equipment /facilities, its implementation may not be feasible without appropriate assistance.

This comment is very important since some importing countries could use it as a technical barrier.

Assistance was also needed for identification of *Euscepes postfasciatus* to make sure it is not yet present in Africa

7. Standard setting topics and priorities

The biennial call for topics to develop IPPC standards is scheduled for July 2011. Due to budget constraints for 2011 and reduced staff allocated to the IPPC's standards setting programme (which currently contains 146 items), the Secretariat proposes that the Commission on Phytosanitary Measures (CPM) cancels the July 2011 call for topics. The Standards Committee (SC) also supports this cancellation.

Participants were invited to go through the tables presenting the topics to identify the ones of importance for Africa. It was also noted that experts from countries should be en-

couraged to participate in working groups and technical panels. They would also submit topics for standards for their staple products. Otherwise, Africa will continue to be just "receiver" of standards.

8. Phytosanitary capacity development projects and activities databases

At the CPM-5, the CPM encouraged each FAO region to select a contact person as a member of a group to work with the IPPC Secretariat, contracting parties and other stakeholders to catalogue current and planned phytosanitary capacity development activities. Six regions nominated candidates to provide information for the catalogue.

Participants noted that two regions were represented by the same person and recommended that one more person be nominated to represent the sub-Saharan Africa.

In the same frame, the IPPC Secretariat contracted a short term consultant to collect information, develop two phytosanitary databases (one database on capacity development projects-CDP - and the other on capacity development activities-CDA) and to compile a list of possible collaborators to provide more information on phytosanitary capacity development activities (eg. workshops and seminars for national inspectors).

The information that will be contained in the two databases will make it possible to view all relevant phytosanitary capacity building projects and activities within countries and regions and this could assist with determining the gaps and overlaps.

Participants discussed the objectives of these databases and their linkage with the database ARIS 2 (Animal Resources Information System) under development in AUIBAR, aimed at incorporating Phytosanitary data and their transfer to IAPSC web site.

Participants proposed that the main objective of databases be clearly stated: it would serve for coordination purposes both at NPPOs and at RPPO levels. This also means that NPPOs and the RPPOs should have a capacity building strategic plan to direct the interventions. As regards ARIS 2, the databases are meant to strengthen the initiative.

9. Implementation of the IPPC

Participant noted that capacity development is essential



ACTIVITES DU CPI/UA/IAPSC/UA'S ACTIVITIES

for the implementation of the Convention and its standards; particularly for developing countries. Mr Bakak, the facilitator of this item presented two important programmes meant to assist the implementation :

- a long term strategy with operational plans for capacity development to provide a comprehensive scheme to use in furthering the work of IPPC in this area.
- an implementation programme called the Implementation Review and Support System (IRSS) established to facilitate the implementation of IPPC, its standards and recommendations.

The system involves two mechanisms :

a Helpdesk to answer questions regarding capacity development and assist with programme development; and an assessment of the phytosanitary capabilities of countries utilizing information gathered from the PCE tool.

Participants took note of the information.

10.Context of Crop Protection in the Comprehensive Africa Agriculture Development Programme (CAADP)

Mrs. Hannah Clarendon, Crop Protection Officer for Africa, gave a brief presentation on the subject. She informed the participants about a study being undertaken through CABI to make an overall assessment of the needs of crop protection programmes at national, sub-regional and continental levels; to review important literature on the current state of crop protection in Africa and to develop a draft strategic framework for crop protection in Africa, specifically in relation to CAADP and its different pillars.

She pointed out that Crop Protection links to the CAADP pillars 2, 3 and 4 as follows :

- Phytosanitary issues – market access Pillar 2
- Pest management- Food security and emergency response, Pillar 3
- Environment protection, Pillar 4
- Research harmonization of policies, Pillar 4

For each pillar, Mrs. Hannah Clarendon provided the addresses of the lead technical agency and the contact person.

During discussions, it was recommended to NPPOs to make sure that Phytosanitary and Crop Protection issues are included in the national CAADP COMPACT. However, it appeared that in some cases, NPPOs were not informed about the preparation and submission of national COMPACT.

11.Phytosanitary capacity building strategy for Africa

A draft of the strategy submitted by a Consultant for comments was presented by Prof. Bahama , Senior Scientific Officer at IAPSC. He recalled the main steps of the preparation process which were the following :

1. An African focus group meeting of selected experts from African NPPO's (Tanzania, Kenya, Gabon, Cameroon, Coˆte d'Ivoire, Zambia, CABI, FAO, Private Sector, IAPSC) to discuss outputs from IPPC Open Ended Working group (OEWG) on Building National Phytosanitary Capacity and to develop the structure of the full proposal
 2. Participation of 2 participants at the OEWG, who later attended the African focus group to report on the meeting .
 3. Proposal preparation including stakeholder consultations at national level and finally
 4. Proposal finalization and promotion.
- Steps 1 and 2 have been completed and step 3 is under way.

The focus group meeting identified the following eight priorities for a Phytosanitary Capacity Building for Africa : awareness, advocacy, resource mobilization; policy, regulations; roles and mandates of regional and sub regional organisations; human resources , infrastructure, facilities, equipment; surveillance, emergency response, risk analysis; import and export control systems; standard setting and implementation.

The Consultant added some more strategic areas and suggested activities under each strategic area. He proposed at the end of the draft, the way forward.

By presenting the document to participants at the meeting, AU-IAPSC expected to get inputs from countries since no feedback had been obtained hitherto.

Comments made by participants include :

- To clearly indicate how the strategy links to CAADP;
- To separate phytosanitary and other aspects of crop protection;
- To identify new but realistic sources of funding;
- To make it a broad framework in which national phytosanitary capacity development initiatives would fit.

The documents will be presented as a side event at CPM6

ACTIVITES DU CPI/UA/IAPSC/UA'S ACTIVITIES

with the expectations that delegates from countries will enrich it.

12. Draft specifications

Two draft specifications for ISPMs were analyzed :

- Establishment and maintenance of fruit fly regulated areas in the event of outbreak detection in pest free areas for fruit flies;
- International movement of seed

Participants went through the draft to see if everything had been taken into account in the "terms of reference". They suggested that an additional task be inserted for the expert working group on fruit flies: the stakeholders to be identified in order for the procedures to be developed for them. This would help address difficulties encountered with some stakeholders during implementation. It was also recalled that for any standard to be implemented nationally, countries should have a regulation to allow its implementation.

Concerning the draft specification on the international movement of seed, participants agreed that it is very important for Africa which is often importing seeds. The involvement of AU- IAPSC together with African NPPOs at all stages of development of this standard was strongly recommended. NPPOs should also involve seed production and seeds certification services in order to harmonize procedures.

13. General discussions

Two questions were raised throughout the meeting: the low rate of submission of comments on draft standards to IPPC by countries and the involvement of the private sector. Participants reflected on the possible strategy to facilitate delegate participation in Regional consultations, to report, consult with various stakeholders at national level and submit comments to IPPC Secretariat. It was suggested that action be taken at a higher level (Permanent Secretary) to ensure that stakeholders are informed after every consultation/meeting. The SPS committees established by the PANSPSO project should also contribute to that objective. In addition, countries (NPPOs) should think of including in their budget funding of consultations.

As regard the involvement of the private sector, it was agreed that phytosanitary services are an example of a

particular case where good public-private partnership is required. The private sector needs a good phytosanitary system to support its trade, but a strong private sector stimulates and provides opportunity for the development of the phytosanitary service. The enabling environment must therefore be such that the private sector entities can generate financial returns from investing in sustainable crop protection and strengthening of phytosanitary systems.

Concerning the comments, participants were invited to utilize them as they felt appropriate in their preparation of national comments to be sent to IPPC Secretariat latest on the 28th February 2011.

Finally, participants discussed about the meetings held on Sunday prior to CPM. There used to be one meeting for SADC member countries and another for all African delegates chaired by IAPSC. Participants felt that there is no need to host two separate meetings. IAPSC had contact with SADC and agreed to host one joint meeting on Sunday 13 March 2011.

14. Closing session

Closing remarks were made by Mr. Marcel Prosper BAKAK on behalf of the Director of the Cameroonian NPPO. Participants were thanked for their valuable contributions and encouraged to submit the comments on the draft standards latest on 28th February 2011.

CPM technical meetings are a mechanism for building a common position on plant health issues at critical steps ; continental HPPOs meetings as well as continuous electronic fora/emails, they are considered critical in the standards setting process.



ACTIVITES DU CPI/UA/IAPSC/UA'S ACTIVITIES

2012 - 2014 BUDGET PLANING WORKSHOP OUAGADOUGOU, 16-17 MARCH, 2011 AU-IAPSC

1. Introduction

Organized by the Directorate and Strategic Planning Policy, Monitoring, Evaluation and Resource Mobilisation (SPPMERM) of the African Union Commission, the workshop held in Ouagadougou, Burkina Faso, from 16 to 17 March 2011.

1.1. Legal basis of the mission

The workshop was authorized by his Excellency the Chairperson of the African Union Commission.

1.2. Administrative basis of the mission

The mission was foreseen in the mission programme of the Strategic Planning Policy, Monitoring, Evaluation and Resource Mobilization (SPPMERM).

1.3. Scope of the mission

The scope of the mission was indicated in an official letter from SPPMERM to various services authorities. The issues to be addressed during this meeting were essentially :

- Building capacity of participants on results based Management programmes and composite budgeting for 2012-2014;
- Application of logical framework approach and use of SMART indicators in project proposals.
- Improvement and submission of 2012 project proposals to SPPMERM for AUC by representatives of each office present at the workshop.

2. Objectives

The workshop aimed at focusing on how best African Union can begin to achieve results that Member States expect and formulating credible project proposals that focus on tangible results for the target audience; how such projects can be monitored, producing 'SMART' indicators. Specifically, participants had to improve on their prepared project proposals for 2012 and beyond prior to submission to SPPMERM.

3. Organization of the mission

Authorized by the Chairperson of the African Union Commission, the planning workshop was held in Ouagadougou from March 16-17, 2011. It was organized by the SPPEMRM in collaboration with AU- SAFGRAD which saw the participation of 12 representatives from AU-IAPSC-Cameroon, AU-ACHPR-the Gambia, AU/ACLAN-Mali, SPPMERM-Ethiopia, AU-STRC-Nigeria, AU-CELTHO-Niger and AU-SAFGRAD- Burkina Faso. The mission team consisted of Mr. Nana Sani Flaubert and Mr. Zafack Joseph.

The meeting began with a welcome address by Mr. Yousoupha Mbengue, Ag Director of AU/SAFGRAD, followed with the introductory remarks of Mr. Cosby U.Nkwazi, Strategic planner, who focused on the new approach of reporting and template filling which is an internal document of SPPMERM. It was a solemn moment to look for a way to have the same understanding in project proposal elaboration.

Two presentations were made respectively by Mr. Cosby and Mr. Mabote on planning, results-based management programmes and budget for 2012-2014 and terminology.

4. Findings and observations

Participants learnt things to consider when preparing projects and were help to improve on their proposals prior to submission. After the explanations given, the mission team from AU-IAPSC submitted to Mr. Cosby, after improvement, the office project proposal for 2012 and beyond.

5. Conclusion

A logical and understandable procedure for approval of project proposals is being followed. The procedure, however, is still to be properly set up. The new approach needs to be encouraged to avoid delay in the budget programme implementation phase that always starts late after approval. SPPMERM and AU-SAFGRAD were lauded for organizing and coordinating the workshop.

ACTIVITES DU CPI/UA/IAPSC/UA'S ACTIVITIES

ATELIER DE PLANIFICATION DES PROGRAMMES BUDGET 2012 OUAGADOUGOU ; BURKINA-FASO DU 16 AU 17 MARS 2011

1- INTRODUCTION

Organisé par la Direction de la Planification Stratégique, Gestion, Evaluation et Mobilisation des Ressources de la Commission de l'Union Africaine, un atelier de formation s'est tenu du 16 au 17 Mars 2011 à Ouagadougou au Burkina Faso. Les bureaux techniques suivants ont pris part aux travaux :

- ACALAN-Bamako
- CPI-Yaoundé
- STRC-Lagos
- CELTHO-Niamey
- ACHPR-Banjul et
- SAFGRAD-Ouagadougou

2- BUT DE LA MISSION

L'atelier avait pour but de planifier les programmes budget 2012 des différents bureaux et organes de la Commission de l'Union Africaine.

3- L'OBJECTIF GLOBAL

L'objectif global de l'atelier était de permettre aux bureaux et organes de la CUA de présenter des programmes selon un canevas commun et rechercher la tangibilité et la visibilité de l'action de la CUA dans les pays membres. L'atelier de Ouagadougou visait aussi à renforcer la compréhension des services et bureaux techniques de la CUA en matière de :

- Planification;
- Gestion;
- Evaluation et
- Budgétisation des programmes

Il a été surtout question de s'imprégner de l'approche de gestion basée sur les résultats.

4- LES OBJECTIFS SPECIFIQUES

Ils étaient les suivants :

- S'accorder sur la terminologie usuelle de la CUA pour l'élaboration des programmes ;
- Amener le personnel technique de la CUA à être davantage focalisé vers les résultats ;
- Réaliser des actions beaucoup plus visibles par les pays membres.

5- DEROULEMENT DES TRAVAUX

La cérémonie d'ouverture a été présidée par M. Youssoupha MBENGUE, représentant le Coordonateur du bureau UA-SAFGRAD, absent pour des raisons de santé.

Les travaux ont été conduits par MM. Mabote RETSE-LISITSOE Simon et Cosby U. Nkwazi de la CUA-SPPMERM (Strategic Planning Programming, Monitoring, Evaluation and Resources Mobilization). Les travaux ont connu deux phases majeures, notamment : la phase de présentation des généralités et celle de la révision des projets proposés par les différents bureaux présents à l'atelier.

5.1- Première phase des travaux: Généralités

Des présentations des deux cadres du SPPMERM, il ressort qu'un Cadre Logique institutionnel, Logical Framework Approach (LFA) a été adopté et mis en œuvre depuis 2010. Lors de l'élaboration des projets, l'application effective de ce LFA doit à la fois apporter des réponses aux questions suivantes :

- Pourquoi ?

Il s'agit ici de ressortir les motivations essentielles à la recherche des résultats envisagés.



ACTIVITES DU CPI/UA/IAPSC/UA'S ACTIVITIES

- *Quoi faire?*

Il faut ressortir les actions et services spécifiques nécessaires à l'atteinte des résultats attendus.

- *Comment ?*

Les activités à mettre en œuvre ainsi que les ressources nécessaires à l'obtention des résultats attendus.

5.1.1- Application du LFA

Le LFA recommande que :

- L'activité à mettre en œuvre doit être déduite du plan stratégique global avec une attention plus accrue sur l'approche de gestion basée sur les résultats ; Results-Based Approach (RBA).
- Tous les projets d'une stratégie institutionnelle doivent s'arrimer à l'objectif stratégique global.
- Le classement des causes et effets doit avoir plusieurs niveaux.
- Par conséquent, pour tout projet, il faut identifier le niveau approprié.
- le point de vue de l'exécutant du projet.

5.1.2- Primauté de point de vue

- Etablir le point de vue. Quelle est la cible visée par le projet ;
- Définir les changements attendus (project outcomes) - Quels sont les bénéfices du projet.
- Les impacts préconisés par l'exécutant de projet ; Changement de comportement des bénéficiaires ou du système de performance.
- Définir les résultats mesurables (outputs)
- le produit ou service que l'exécutant va enregistrer.
- Eviter surtout la tautologie

5.2- Révision des projets

Cette phase a consisté à relire l'intégralité du projet du CPI avec un des animateurs-représentant de la CUA-SPPMERM pour s'accorder ou rectifier certaines terminologies. Les représentants du CPI à l'atelier ont saisi

l'occasion, à la demande de l'animateur-représentant de la CUA-SPPMERM, pour expliquer la méthodologie réservée à chacune de leurs activités, et faciliter la compréhension de différentes parties du projet du CPI. Ce travail qui a duré deux heures d'horloge a eu pour finalité la production d'un projet concerté entre le CPI et la CUA-SPPMERM. Le document ainsi revu et corrigé a été expédié séance tenante par Mr Cosby U. Nkwazi à Mr Rasugu K. Aroko de la direction du SPPMERM non sans avoir félicité le CPI pour le travail proposé.

6. Quelques éclairages des animateurs

Les facilitateurs de l'atelier ont informé les bureaux des dispositions ci-après :

- la demande de budget supplémentaire ne fait pas de tort au bureau demandeur, mais qu'il faut déjà bien expliquer comment la partie déjà débloquée a été utilisée, et démontrer la nécessité à continuer le programme.
- chaque activité doit être justifiée par des résultats tangibles.
- Il faut porter un grand intérêt à la finalité d'une réunion et justifier qu'elle contribue à atteindre les objectifs. S'assurer ensuite que les participants feront une restitution dès le retour dans leurs pays respectifs.
- les indicateurs doivent être SMART i.e. :

S = Spécifique

M = Mesurable

A = Réalisable

R = Réaliste

T = Limité dans le temps

7. Des perspectives

- le problème de déblocage tardif des fonds trouvera la solution dès lors que le budget de la prochaine année 2012 sera soumis pour adoption au prochain sommet.
- quant aux présentations de projets ou rapports, chaque bailleur de fonds souhaite avoir des informations qui lui conviennent. Dans le souci d'alléger la fourniture de ces informations, un programme de renforcement des capacités est en préparation. Il permettra d'harmoniser les informations demandées.

ACTIVITES DU CPI/UA/IAPSC/UA'S ACTIVITIES

MISSION DU DIRECTEUR DU CPI 20-22 MARS 2011 LIBREVILLE, GABON Dr. Jean Gérard MEZUI M'ELLA

Du 20 au 22 mars 2011, le Directeur du Conseil Phytosanitaire Interafricain de l'Union Africaine s'est rendu à Libreville au Gabon sur instruction de madame la Commissaire de l'Economie Rurale et de l'Agriculture. L'objectif de la mission était de faciliter les contacts souhaités par la hiérarchie entre les autorités de la Communauté Economique des Etats de l'Afrique Centrale (CEEAC) et celles du Gabon dans le cadre de la mise en œuvre du Programme Détaillé du Développement de l'Agriculture en Afrique (PDDAA). Madame la Commissaire de l'Economie Rurale et de l'Agriculture en compagnie de plusieurs de ses collaborateurs faisaient également partie de la délégation.

1- DEROULEMENT DE LA MISSION

- 19 mars 2011 à 21h45 :

Arrivée de Madame la Commissaire de l'Economie Rurale et de l'Agriculture à Libreville et accueil entre autres par le Directeur du Conseil Phytosanitaire Interafricain de l'Union Africaine.

- 20 mars 2011 à 09h00 :

Audience au Ministère de l'Agriculture, de l'Elevage, des Pêches et du Développement Rural. Dans son entretien avec Monsieur le Ministre, Madame la Commissaire demande à son hôte l'état de l'évolution de la mise en œuvre du concept NEPAD/PDDAA et des attentes du Gabon envers le Département de l'Agriculture et de l'Economie Rurale de l'Union Africaine ; étant entendu que le PDDAA est un programme majeur structurant mis en œuvre par ses services avec l'appui des Communautés Economiques Régionales en charge de l'élaboration des politiques d'investissement, de la formulation et de la mise en œuvre des plateformes de partenariat.

En réponse à ces préoccupations exprimées par Mme la Commissaire, le Ministre a indiqué les points suivants qui démontrent de la prise en compte du projet PDDAA :

- Nomination d'un Point Focal PDDAA
- Appropriation par le Gabon du document-cadre du

PDDAA identification du pilier N° 2 comme devant servir de moteur aux activités agricoles du Gabon

- Réunion en préparation devant se tenir au Gabon sur l'appropriation du PDDAA
- Signature d'un pacte entre le Gabon et le PDDAA.
- Renforcement des capacités administratives des autorités en charge des différents aspects liés à l'Agriculture
- Révision de tous les textes relatifs à l'agriculture au Gabon.

Des mesures importantes qui démontrent le sérieux avec lequel le Gabon a accueilli le PDDAA.

2- PERSONNES RENCONTREES

a) Les autorités du Ministère de l'Agriculture, de l'Elevage, des Pêches et du Développement Rural ;

- Secrétaire Général du Ministère de l'Agriculture, de l'Elevage, des Pêches et du Développement Rural ;

- Directeur du Cabinet du Ministre de l'Agriculture, de l'Elevage, des Pêches et du Développement Rural ;

- Conseiller Technique du Ministère de l'Agriculture de l'Agriculture, de l'Elevage, des Pêches et du Développement Rural, chargé du Développement Rural ;

- Directeur Général des Etudes de Laboratoire et des Statistiques au Ministère de l'Agriculture, de l'Elevage, des Pêches et du Développement Rural, Point Focal du NEPAD/PDDAA ;

b) Les autorités de Communauté Economique des Etats de l'Afrique Centrale (CEEAC) ;

- Secrétaire Général de la Communauté Economique des Etats de l'Afrique Centrale (CEEAC) ;

- Le Fonctionnaire en charge de la sécurité alimentaire et du changement climatique et des politiques sectorielles.



ACTIVITES DU CPI/UA/IAPSC/UA'S ACTIVITIES

FIFTH SESSION OF THE COMMISSION ON PHYTOSANITARY MEASURES ROME, ITALY, 22 –26 MARCH 2011 IAPSC

1. INTRODUCTION

The Interafrican Phytosanitary Council of the African Union (IAPSC-AU) was invited by the Director General of FAO to participate to the annual Commission on Phytosanitary Measures (CPM) meeting, the governing body of the IPPC. According to the Agenda, the goals for CPM 6 were the following :

- A robust international standard setting and implementation programme
 - Information exchange systems appropriate to meet International Plant Protection Convention (IPPC) obligations
 - Effective dispute settlement systems
 - Improved phytosanitary capacity of members
 - Sustainable implementation of the IPPC
 - International promotion of the IPPC and cooperation with relevant regional and international organizations
 - Review of the status of plant protection in the world
- The Director and 2 senior Scientific officers of IAPSC attended the meeting. Prior to CPM, a meeting of African delegates chaired by IAPSC was held. IAPSC also organized a side event on the Phytosanitary Capacity Building Strategy for Africa.

The participation of the 2 Officers was funded by the PANSPSO project. The report of the session is presented below.

2. OPENING OF THE SESSION

The Chairperson, Mr Katbeh-Bader (Jordan), asked participants to stand for a minute's silence in memory of the earthquake and tsunami that had occurred in Japan on 11 March 2011. He then opened the meeting.

The Deputy Director General of FAO, Ms Tutwiler, on behalf of the Director General, welcomed the CPM members to the FAO and wished them a productive meeting. She linked the IPPC's work with the global

challenges to fight hunger and protect the environment. She noted the development of the IPPC strategic framework and praised the efforts to reduce duplication with FAO reporting system. She noted that some countries had difficulties implementing ISPMs due to a lack of capacity. The IPPC's capacity development activities and the Implementation Review and Support System (IRSS) help desk would be a great step towards addressing this challenge.

The Secretary of the IPPC, Mr Yukio Yokoi, thanked those present and welcomed five new contracting parties to IPPC: Benin, Kazakhstan, Mongolia, Singapore and Tajikistan. He briefly summarized the resource mobilization efforts since CPM5.

3. ADOPTION OF THE AGENDA

The agenda was modified to add the following items and was adopted :

- Summary of budget and operational plan for 2012 and 2013;
- Resource mobilization,
- Communication strategy.

4. ELECTION OF THE RAPPORTEUR

The CPM elected Mr Van Alphen (Netherlands) by the CPM as rapporteur.

5. REPORT BY THE CHAIRPERSON OF THE CPM

The CPM Chairperson presented his report where he encouraged members to promote the IPPC and to consult with industry. Financial sustainability is needed and he felt that the IPPC may need to think "outside the box". He thanked those who had made financial and in-kind staff contributions to IPPC and encouraged countries to further support the IPPC.

ACTIVITES DU CPI/UA/IAPSC/UA'S ACTIVITIES

He thanked the Bureau and the Secretariat for their work in past year and looked forward to a successful work programme in 2011.

6. REPORT BY THE SECRETARIAT

The Secretary introduced the report by the IPPC Secretariat for 2010. He thanked in-kind and financial contributions received in 2010 and other voluntary contributions to assist compiling comments and providing translation. He also provided an overview of the work performed under each of the goals.

The Secretariat noted the need to improve preparation for CPM meetings and to report on all meetings in a more timely manner and stressed the need to strengthen the Secretariat to meet these demands.

7. REPORT OF THE TECHNICAL CONSULTATION AMONG REGIONAL PLANT PROTECTION ORGANIZATIONS

The report of the 22nd Technical Consultation (TC) among Regional Plant Protection Organizations was presented by Ringolds Arnis, Director General of the European and Mediterranean Plant Protection Organization. A major part of the meeting was the brainstorming session to consider how NPPOs and RPPOs may look in 10 years time. The TC also developed a work plan for 2011-2012. Priorities included electronic certification, IRSS and the risks associated with internet sales. Members suggested that the issue of internet sales be taken up via a fact-finding activity and proposed it as a topic for the Scientific Session for CPM7 (2012).

8. REPORT OF OBSERVER ORGANIZATIONS

The following organizations presented their reports on issues relevant to IPPC :

- World Trade Organization SPS Committee
- Standards and Trade Development Facility (STDF);
- International Atomic Energy Agency;
- International Forestry Quarantine Research Group

Other observer organizations provided written reports :

- Convention on Biological Diversity;
- Inter-American Institute for cooperation on Agriculture (IICA);
- OIE;
- International Regional Organization for plant and animal health (OIRSA);
- Pacific Plant Protection Organization (PPPO);
- CAB International.

The CPM took note of the reports.

9. INTERNATIONAL STANDARD SETTING AND IMPLEMENTATION PROGRAMME

- Report by of the Standards Committee Chairperson

The Chairperson of the Standards Committee (SC), Ms Jane Chard (United Kingdom), presented a report detailing the activities of the SC during 2010. She highlighted some key points and thanked the SC and the Secretariat for their work.

- Adoption of International Standards: special process

The Secretariat introduced the following three annexes to ISPM 28: 2007 "Phytosanitary treatments for regulated pests" submitted to CPM6 for adoption under the special process :

- ISPM 28 : irradiation treatment for *Cylas formicarius elegantulus*
- ISPM 28 : irradiation treatment for *Euscepes postfasciatus*
- ISPM 28 : irradiation treatment for *Ceratitis capitata*.

The CPM adopted the 3 annexes.

- Adoption of International Standards: regular process

Three draft texts were introduced by the Secretariat for consideration by CPM :

- A revision of ISPM 7: Phytosanitary certification system;



ACTIVITES DU CPI/UA/IAPSC/UA'S ACTIVITIES

- A revision of ISPM 12: Phytosanitary certificates;
- An appendix to ISPM 26, 2006: Establishment of pest free areas for fruit flies (Tephritidae): Fruit fly trapping.

The secretariat noted that there have been over 800 comments submitted during the comment period 14 days prior to CPM. The time was therefore very limited to compile and evaluate them. Evening sessions were held on two nights to work further on these new draft standards and incorporate comments. Afterwards, the CPM adopted the appendix to ISPM 26:2006 on Fruit fly trapping.

- Update on registration of ISPM 15 symbol

The Secretariat introduced the paper describing the status of registration of the ISPM 15 symbol throughout the world. Options to protect the symbol have been proposed by a consultant. Concerning national implementation of ISPM 15, the Secretariat noted that there was a considerable demand for information. The CPM noted the progress made in developing an application on the IPP for countries to upload and exchange information on national implementation of ISPM 15 and encouraged countries to make use of the dedicated electronic form on the IPP.

- Implementation challenges

The Secretariat had recently received a letter from a group of countries regarding implementation issues that did not amount to a formal dispute. The concern was that there had been no response from countries to which non-compliance had been notified. A proposal to use the Subsidiary Body for Dispute Settlement (SBDS) to provide clarifications on implementation of ISPMs was circulated by a member. The CPM asked the Secretariat to present the paper to SBDS and report back to CPM7 on the outcome of the SBDS' deliberations.

10. INFORMATION EXCHANGE SYSTEMS

The Secretariat introduced a paper on the general state of reporting by contracting parties in line with their obli-

gations and with relevant ISPMs. It has been noted that national usage of the IPP was variable and some information on the portal was not up-to-date. The CPM noted that many contracting countries do not fully meet their IPPC reporting obligations and encouraged them to do so.

11. PHYTOSANITARY CAPACITY DEVELOPMENT

The Secretariat presented a paper reporting on the Expert Working Group on Capacity building. The group has produced 9 priorities that were regarded as essential for a short term work programme on capacity building. The CPM noted the priorities, activities, initiatives and outcomes from the meeting of the EWG and encouraged donors to support capacity development projects consistent with the IPPC strategy.

The Secretariat also presented a paper describing two databases that have been developed to house data on capacity building projects and capacity building activities related to the work of the IPPC. The CPM encouraged partners and collaborators to participate in this initiative and noted the collaboration with STDF to make these databases available to the wider phytosanitary community.

Recent developments and progress since CPM 5 on developing an updated Phytosanitary Capacity Evaluation (PCE) Tool were presented.

As regard regional workshops on the review of drafts ISPMs, the Secretariat was disappointed that there had been a low rate of commenting on the drafts despite indications from the workshop evaluations that the response rate would be higher.

It was recalled that according to current standard setting procedures, comments prepared during the regional workshops are not considered as official unless a member country requests that the Secretariat accepts them.

Lastly, the Secretariat introduced a "Guide to the implementation of phytosanitary standards in forestry" recently published by FAO Forest Assessment, Management and Conservation Division. The Secretariat noted the importance of NPPOs participation throughout the process of producing this kind of publication.

ACTIVITES DU CPI/UA/IAPSC/UA'S ACTIVITIES

NPPOs were also encouraged to participate in the implementation plan of the guide.

12. STATUS OF PLANT PROTECTION IN THE WORLD

The Secretariat presented an update on progress in 2010 regarding electronic certification. A working group is planned for 7-11 June in Korea with the aim to develop some material for inclusion into the Annex of ISPM 12.

Another paper introducing the concept of aquatic plants was presented by the Secretariat. The CPM agreed that the issue of aquatic plants within the IPPC be considered by the Bureau and then reported back to CPM 7 (2012).

A scientific session including approaches for addressing pests risks associated with grain and wood was held during CPM6 meeting. Members were encouraged to email topics for CPM7 while noting that the "phytosanitary risks of internet sales" was already a proposed topic.

13. ELECTION OF A CREDENTIALS COMMITTEE

The CPM elected a Credentials Committee in conformity with the customary rules. It was composed of seven members, one per FAO region. For Africa region, M.Suglo from Ghana was elected.

14. IPPC SECRETARIAT STRATEGIC FRAMEWORK 2012-2019

The Commission was presented with a draft Strategic Framework for 2012-2019. After discussing the draft Strategic Framework in the plenary and in an evening session, the CPM reached consensus on four strategic objectives, namely to :

- protect sustainable agriculture and enhance global food security through the prevention of pest spread;
- protect the environment, forests and biodiversity against plant pests;
- facilitate economic and trade development through the promotion of harmonized, scientifically-based phy-

tosanitary measures; and

- develop phytosanitary capacity for members to accomplish the objectives above.

Further work is still needed on the details of the draft Strategic Framework, but the Commission agreed with its intent and the overall structure. Dr. Colin Grant, Executive Manager of the Biosecurity Services Group for Plants of Australia, commented that "as a document and as a framework I found it very convincing. It provides a clear statement of what the IPPC is and where it proposes to focus its efforts. I strongly endorse and support any efforts that we can put into finalizing this document and having a product that we can use to portray the big picture." Rebecca Bech, Deputy Administrator of Plant Protection and Quarantine of the U.S. Animal Plant Health Inspection Service, indicated her country's support for the rapid completion of the strategic framework, stating that "the strategic framework would position the IPPC to proactively respond to new global challenges."

All members were encouraged to send written comments and technical support information on the proposed Strategic Framework to the IPPC Secretariat (ippc@fao.org) by 15 April 2011.

15. CONCLUSION

The participation to CPM 6 offered an opportunity to IAPSC as a Regional Plant Protection Organization to coordinate African positions for the various issues related to standards and their implementation.

The Phytosanitary Capacity Building Strategy under preparation in collaboration with STDF and CABI was also presented and inputs received from African delegates attending CPM6.

The role of IAPSC has also been instrumental by coordinating the meeting for electing members and potential replacements for CPM subsidiary bodies.

We thank the PANSPSO project for having funded the participation of the 2 officers of IAPSC.



ACTIVITES DU CPI/UA/IAPSC/UA'S ACTIVITIES

SIDE EVENTS

Two main side events were organized by Africa during the CPM 6: the strategic framework for crop protection in Africa by the FAO Africa-region office and another on the Phytosanitary Capacity Building Strategy for Africa by AU-IAPSC.

With regards to the Framework for Crop Protection in Africa, a presentation reviewing the explicit and implicit references to crop protection in the CAADP document was made by Hannah Clarendon, the Regional Crop Protection Officer for Africa.

The presenter also identified possible implications for crop protection for implementing the 4 pillars of CAADP. She urged crop protection stakeholders to engage themselves into the CAADP process wherever possible.

It was emphasized that with appropriate engagement of crop protection stakeholders in the country process, the national investment plan should reflect priority crop protection issues. It is not clear to what extent crop protection professionals are aware of the CAADP process in their country, but certainly in several cases it appears that involvement and awareness is low. However, in some countries where an investment plan (COMPACT) has been produced, crop protection issues are well addressed.

This joint effort of FAO and CABI for crop protection's advocacy was highly recognized by African delegates and international partners such as STDF/WTO. They were encouraged to carry on discussions with NEPAD, the authority for CAADP implementation.

Concerning the Phytosanitary Capacity Building Strategy presented by IAPSC, it recalled that most African countries suffer intrinsic difficulties in the implementation of the IPPC and associated standards, for lack of public and political awareness, obsoles-

cence of regulatory framework, deficiencies in institutional aspects (authority, obligation, sustainability), deficiencies in management and availability of operational documented procedures, deficiencies in international/regional liaison, insufficiencies in technical skills, deficiencies in infrastructure and equipment.

Outlines of the strategic areas and related activities as suggested by a Consultant hired by CABI on an STDF project preparation funds granted to IAPSC were presented.

Delegates were requested to comment on the draft strategy that had been sent to them prior to CPM. After discussions, it was agreed that more time was needed to go through the document and comment. The draft was to be sent again to all NPPOs for final comments during the General Assembly of IAPSC, end April 2011.

This joint effort of FAO and CABI for crop protection's advocacy was highly recognized by African delegates and international partners such as STDF/WTO. They were encouraged to carry on discussions with NEPAD, the authority for CAADP implementation.

ANALYSE SCIENTIFIQUE/SCIENTIFIC ANALYSIS

GLOBAL WARMING AND CLIMATE CHANGE: IMPACT ON ARTHROPOD BIODIVERSITY, PEST MANAGEMENT, AND FOOD SECURITY

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Abstract

Global warming and climate change will trigger major changes in diversity and abundance of arthropods, geographical distribution of insect pests, population dynamics, insect biotypes, herbivore plant interactions, activity and abundance of natural enemies, species extinction, and efficacy of crop protection technologies. Changes in geographical range and insect abundance will increase the extent of crop losses, and thus, will have a major bearing on crop production and food security. Distribution of insect pests will also be influenced by changes in the cropping patterns triggered by climate change. Major insect pests such as cereal stem borers (*Chilo*, *Sesamia*, and *Scirpophaga*), the pod borers (*Helicoverpa*, *Maruca*, and *Spodoptera*), aphids, and white flies may move to temperate regions, leading to greater damage in cereals, grain legumes, vegetables, and fruit crops. Global warming will also reduce the effectiveness of host plant resistance, transgenic plants, natural enemies, biopesticides, and synthetic chemicals for pest management. Therefore, there is a need to generate information on the likely effects of climate change on insect pests to develop robust technologies that will be effective in future under global warming and climate change.

INTRODUCTION

Crop plants used as food by human beings are damaged by over 10,000 species of insects, and cause an estimated annual loss of 13.6% globally (Benedict 2003) and 23.3% in India (Dhaliwal et al. 2004). In India, the average annual losses have been estimated to be 17.5% valued at US\$17.28 billion in eight major field crops (cotton, rice, maize, sugarcane, rapeseed-mustard, groundnut, pulses,

coarse cereals, and wheat) (Dhaliwal et al. 2010). Losses due to insect damage are likely to increase as a result of changes in crop diversity and increased incidence of insect pests due to global warming. Current estimates of changes in climate indicate an increase in global mean annual temperatures of 1°C by 2025, and 3°C by the end of the next century. The date at which an equivalent doubling of CO₂ will be attained is estimated to be between 2025 and 2070, depending on the level of emission of greenhouse gases (IPCC 1990a,b).

Mean annual temperature changes between 3 and 6°C are estimated to occur across Europe, with greatest increases occurring at high latitudes. Increased temperatures have drastically affected the rice production due to decrease crop duration in Philippines (10% reduction in yield in rice per 1°C rise in temperature) (Peng et al. 2004). An increase of 6°C in temperature, and precipitation deficit of 300 mm reduced the maize yield by 36% in the European Union (Ciais et al. 2005).

Host-plant resistance, bio-pesticides, natural enemies, and synthetic chemicals are some of the potential options for integrated pest management. However, the relative efficacy of many of these pest control measures is likely to change as a result of global warming. Changes in precipitation are of greater importance for agriculture than temperature changes, especially in regions where lack of rainfall may be a limiting factor for crop production (Parry 1990). Global mean annual precipitation may increase as a result of intensification of the hydrological cycle (Rowntree 1990), which will cause disruption of agriculture as the cropping systems and the composition of fauna and flora will undergo a gradual change (Porter et al. 1991; Sutherst 1991). High mobility and rapid population growth will increase the extent of losses due to insect pests. Geographical distribution of insect pests confined to tropical and subtropical



ANALYSE SCIENTIFIQUE/SCIENTIFIC ANALYSIS

regions will extend to temperate regions along with a shift in the areas of production of their host plants, while distribution and relative abundance of some insect species vulnerable to high temperatures in the temperate regions may decrease as a result of global warming. These species may find suitable alternative habitats at greater latitudes. Many species may have their diapause strategies disrupted as the linkages between temperature and moisture regimes, and the daylength will be altered. Genetic variation and multi-factor inheritance of innate recognition of environmental signals may mean that many insect species will have to adapt readily to such disruption. Global warming and climate changes will result in :

- Extension of geographical range of insect pests,
- Increased over-wintering and rapid population growth,
- Changes in insect – host plant interactions,
- Increased risk of invasion by migrant pests,
- Impact on arthropod diversity and extinction of species,
- Changes in synchrony between insect pests and their crop hosts,
- Introduction of alternative hosts as green bridges, and
- Reduced effectiveness of crop protection technologies.

Climate change will also result in increased problems with insect transmitted diseases. These changes will have major implications for crop protection and food security, particularly in the developing countries, where the need to increase and sustain food production is most urgent. Long-term monitoring of population levels and insect behavior, particularly in identifiably sensitive regions, may provide some of the first indications of a biological response to climate change. In addition, it will also be important to keep ahead of undesirable pest adaptations, and therefore, it is important to carefully consider global warming and climate change for planning research and development efforts for pest management and food security in future.

Impact on global warming on arthropod diversity and extinction of species Arthropods (insects, spiders, and mites) are the most abundant and diverse group of organisms (Kannan and James 2009; Gregory et al. 2009) (Table 1).. Arthropods are the most important and diverse component of terrestrial ecosystems and occupy a wide variety of functional niches and microhabitats (Kremen et al. 1993). We can take advantage of the terrestrial arthropod diversity as a resource for conservation and management of different eco-systems. Monitoring of terrestrial arthropods can pro-

vide early warnings of ecological changes due to climate change. Arthropods can be used as indicators of environmental change more rapidly than the vertebrates (Schermer et al. 2000; Gregory et al. 2009). For monitoring purposes, indicator assemblages should exhibit varying sensitivities to environmental changes, and exhibit diversity in life-history and ecological interactions. Realistic information on arthropod diversity must be integrated into policy planning and management practices if ecosystems are to be managed for use by future generations.

Ecosystem baselines that document arthropod species assemblages in a manner comparable in space and time are key to interpretation and implementation of strategies designed to mitigate the effects of global warming and climate change on biodiversity. Main effects of climate change and pollution on arthropod communities result in decreased abundance of decomposers and predators, and increased herbivory, which may have negative consequences for structure and services of the entire ecosystems. Responses of arthropods to pollution depend on both temperature and precipitation, and ecosystem-wide adverse effects are likely to increase under predicted climate change (Zvereva and Kozlov 2010). Consequences of temperature increases of 1 to 2 °C will be comparable in magnitude to the currently seen climate change in the Antarctic region (Bokhorst et al. 2008).

Increase in rainfall in the Pampas region of Argentina will largely affect the species with poor dispersal capabilities, which will limit their ability to expand their home range. The most affected among the beetle species are the habitat specialists (Xannepuccia et al. 2009). At higher trophic levels, an indirect effect in terms of habitat loss and a reduction in prey availability has also been observed. Large scale changes in rainfall due to climate change will have a major effect on the abundance and diversity of arthropods. Extreme climatic events such as drought are likely to decrease multi-trophic diversity and change the composition of arthropod communities, which in turn might affect the other associated taxa. In the forest eco-systems, chronic stress significantly altered community composition, and the trees growing under high stress supported 1/10th the number of arthropods compared to trees growing under more favorable conditions (Talbot Trotter et al. 2008). Increasing tree stress was also correlated with an eight to 10-fold decline in arthropod species richness and abundance. Arthro-

ANALYSE SCIENTIFIQUE/SCIENTIFIC ANALYSIS

pod richness and abundance on individual trees were positively correlated with the tree's radial growth during drought, suggesting that tree ring analysis could be used as a predictor of arthropod diversity (Stone et al. 2010).

Table 1. Species diversity among different groups of organisms.

Organisms	Number of species
Viruses, algae, protozoa, etc.	80,000
Bacteria	4,000
Fungi	72,000
Plants	270,000
Animals: Invertebrates (insects)	1,360,000
Animals : Vertebrates	48,500
Total	1,834,500

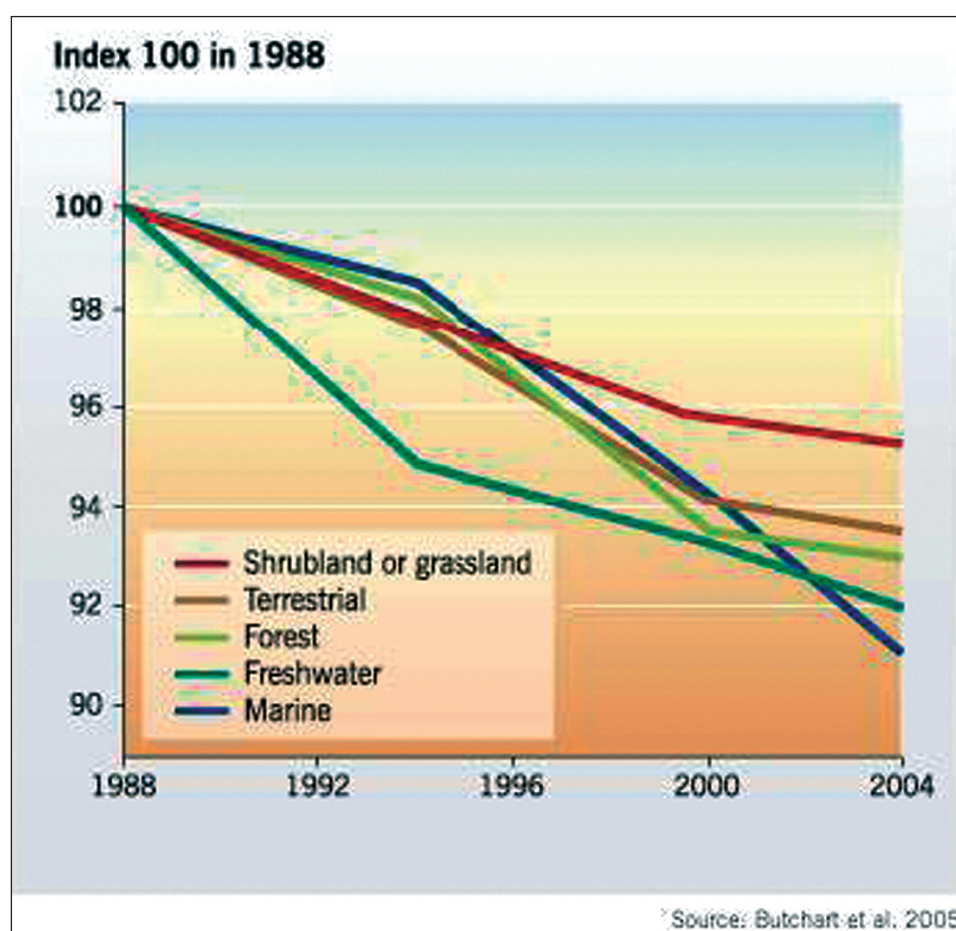


Fig. 1. Threatened species: Rate of species extinction in different eco-systems (Butchart et al. 2005).

ANALYSE SCIENTIFIQUE/SCIENTIFIC ANALYSIS

Speciation takes between 100 and 1,000,000 years, providing between 10 and 10,000 new species per annum. Nearly 99.9% of all species that ever existed have become extinct. We are now living through the sixth extinction spasm, which is largely driven by human activities. The relative abundance of different insect species may change rapidly due to climate change, and the species unable to withstand the stresses may be lost in the near future (Jump and Penuelas 2005; Thomas et al. 2004). The current extinction rates are 100 to 1,000 times greater than what has happened earlier, and nearly 45 to 275 species are becoming extinct everyday (Fig. 1).

Impact of climate change on geographic distribution and population dynamics of insect pests

Climate change will have a major effect on geographic distribution of insect pests, and low temperatures are often more important than high temperatures in determining geographical distribution of insect pests (Hill 1987). Increasing temperatures may result in a greater ability to overwinter in insect species limited by low temperatures at higher latitudes, extending their geographical range (EPA 1989; Hill and Dymock 1989; Elphinstone and Toth 2008), and sudden outbreaks of insect pests can wipe out certain crop species, and also encourage the invasion by exotic species (Kannan and James 2009). Spatial shifts in distribution of crops under changing climatic conditions will also influence the distribution of insect pests in a geographical region (Parry and Carter 1989). Some plant species may be unable to follow the climate change, resulting in extinction of species that are specific to particular hosts (Thomas et al.

2004). However, whether or not an insect pest would move with a crop into a new habitat will depend on other environmental conditions such as the presence of overwintering sites, soil type, and moisture, e.g.,

populations of the corn earworm, *Heliothis zea* (Boddie) in the North America might move to higher latitudes/altitudes, leading to greater damage in maize and other crops (EPA 1989). For all the insect species, higher temperatures, below the species upper threshold limit, will result in faster development and rapid increase in pest populations as the time to reproductive maturity will be reduced considerably.

In addition to the direct effects of temperature changes on development rates, improvement in food quality due to abiotic stress may result in dramatic increases in growth of some insect species (White 1984), while the growth of certain insect pests may be adversely affected (Maffei et al. 2007). Pest outbreaks are more likely to occur with stressed plants as a result of weakening of plants' defensive system, and thus, increasing the level of susceptibility to insect pests (Rhoades 1985).

Global warming will lead to earlier infestation by *H. zea* in North America (EPA 1989), and *Helicoverpa armigera* (Hub.) in North India (Sharma 2010), resulting in increased crop loss. Rising temperatures are likely to result in availability of new niches for insect pests. Temperature has a strong influence on the viability and incubation period of *H. armigera* eggs (Dhillon and Sharma 2007). Egg incubation period can be predicted based on day degrees required for egg hatching, which decreases with an increase in temperature from 10 to 27 °C, and egg age from 0 to 3 days (Dhillon and Sharma 2007). An increase of 3°C in mean daily temperature would cause the carrot fly, *Delia radicum* (L.) to become active a month

ANALYSE SCIENTIFIQUE/SCIENTIFIC ANALYSIS

earlier than at present (Collier et al. 1991), and temperature increases of 5 to 10°C would result in completion of four generations each year, necessitating adoption of new pest control strategies.

An increase of 2°C will reduce the generation turnover of the bird cherry aphid, *Rhopalosiphum padi* (L.) by varying levels, depending on the changes in mean temperature (Morgan 1996). An increase of 1 and 3°C in temperature will cause northward shifts in the potential distribution of the European corn borer, *Ostrinia nubilalis* (Hub.) up to 1,220 km, with an additional generation in nearly all regions where it is currently known to occur (Porter et al. 1991).

Overwintering of insect pests will increase as a result of climate change, producing larger spring populations as a base for a build-up in numbers in the following season. These may be vulnerable to parasitoids and predators if the latter also overwinter more readily. Diamond back moth, *Plutella xylostella* L. overwintered in Alberta in 1994 (Doddall 1994), and if overwintering becomes common, the status of this insect as a pest in North America will

increase dramatically. There may also be increased dispersal of airborne insect species in response to atmospheric disturbances. Many insects such as *Helicoverpa* spp. are migratory, and therefore, may be well adapted to exploit new opportunities by moving rapidly into new areas as a result of climate change (Sharma 2005).

Effect of global warming on species diversity its influence on pest management

Biodiversity plays an important role in abundance of insect pests and their natural enemies (Alteiri 1994;

Sharma and Waliyar 2003). There is a need to increase functional diversity in agro-ecosystems vulnerable to climate change to improve system resilience, and decrease the extent of losses due to insect pests (Newton et al. 2009). However, changes in cropping patterns as a result of climate change will drastically affect the balance between insect pests and their natural enemies. Since climate change will lead to a shift in cultivation of crops in non-traditional areas and crop rotations, this may influence the prevalence and importance of specific pests (Maiorano et al. 2008). System diversity can be exploited to enhance the resilience of agro-eco-systems, improve resource utilization, and stabilize yields to cope with the effects of global warming and climate change on food security (Sharma and Waliyar 2003; Newton et al. 2009).

Effect of climate change on expression of resistance to insect pests

Host plant resistance to insects is one of the most environmental friendly components of pest management. However, climate change may alter the interactions between the insect pests and their host plants (Bale et al. 2002; Sharma et al. 2010). Global warming may also change the flowering times in temperate regions, leading to ecological consequences such as introduction of new insect pests, and attaining of a pest status by non-pest insects (Parmesan and Yohe 2003; Fitter and Fitter 2002; Willis et

al. 2008). However, many plant species in tropical regions have the capability to withstand the phenological changes as a result of climate change (Corlett and LaFrankie 1998). Global warming may result on breakdown of resistance to certain insect pests. Sorghum varieties exhibiting rresis-



ANALYSE SCIENTIFIQUE/SCIENTIFIC ANALYSIS

tance to sorghum midge, *Stenodiplosis sorghicola* (Coq.) in India become susceptible to this pest under high humidity and moderate temperatures near the Equator in Kenya (Sharma et al. 1999). There will be increased impact on insect pests which benefit from reduced host defenses as a result of the stress caused by the lack of adaptation to sub-optimal climatic conditions. Chemical composition of some plant species changes in direct response to biotic and abiotic stresses as a result, their tissues less suitable for growth and survival of insect pests (Sharma 2002). However, problems with new insect pests will occur if climatic changes favor the introduction of insect susceptible cultivars or crops. The introduction of new crops and cultivars to take advantage of the new environmental conditions is one of the adaptive methods suggested as a possible response to climate change (Parry and Carter 1989).

Insect - host plant interactions will change in response to the effects of CO₂ on nutritional quality and secondary metabolites of the host plants. Increased levels of CO₂ will enhance plant growth, but may also increase the damage caused by some phytophagous insects (Gregory et al. 2009). In the enriched CO₂ atmosphere expected in the next century, many species of herbivorous insects will confront less nutritious host plants that may induce both lengthened larval developmental times and greater mortality (Coviella and Trumble 1999). The effects of increased atmospheric CO₂ on herbivory will not only be species-specific, but also specific to each insect-plant system. Although increased CO₂ tends to enhance plant growth rates, the larger effects of drought stress will probably result in slower plant growth (Coley and Markham 1998). In atmospheres experimentally enriched with CO₂, the nutritional quality of leaves declined substantially due to dilution of nitrogen by 10 to 30% (Coley

and Markham 1998). Increased CO₂ may also cause a slight decrease in nitrogen-based defenses (e.g., alkaloids) and a slight increase in carbon-based defenses (e.g., tannins). Acidification of water bodies by carbonic acid (due to high CO₂) will also affect the floral and faunal diversity (Gore 2006). Lower foliar nitrogen content due to CO₂ causes an increase in food consumption by the herbivores up to 40%, while unusually severe drought increases the damage by insect species such as spotted stem borer, *Chilo partellus* in sorghum (Sharma et al. 2005). Endophytes, which play an important role in conferring tolerance to both abiotic and biotic

stresses in grasses, may also undergo a change in response to disturbance in the soil due to climate change

(Newton et al. 2009).

Effect of climate change on effectiveness of transgenic crops for pest management

Environmental factors such as soil moisture, soil fertility, and temperature have strong influence on the expression of *Bacillus thuringiensis* (Bt) toxin proteins deployed in transgenic plants (Sachs et al. 1998).

Cotton bollworm, *Heliothis virescens* (F.) destroyed

Bt-transgenic cottons due to high temperatures in Texas, USA (Kaiser, 1996). Similarly, *H. armigera* and *H. punctigera* (Wallen.) destroyed the Bt-transgenic cotton in the second half of the growing season in Australia because of reduced production of Bt toxins (Hilder and Boulter 1999). Cry1Ac levels in transgenic plants decrease with the plant age, resulting in greater susceptibility of the crop to insect pests during the later stages of crop growth (Sachs et al. 1998;

ANALYSE SCIENTIFIQUE/SCIENTIFIC ANALYSIS

Greenplate et al. 2000; Adamczyk et al. 2001; Kranthi et al. 2005). Possible causes for the failure of insect control in transgenic crops may be due to inadequate production of the toxin protein, effect of environment on transgene expression, Bt-resistant insect populations, and development of resistance due to inadequate management (Sharma and Ortiz 2000). It is therefore important to understand the effects of climate change on the efficacy of transgenic plants for pest management.

Effect of global warming on the activity and abundance of natural enemies

Relationships between insect pests and their natural enemies will change as a result of global warming, resulting in both increases and decreases in the status of individual pest species. Changes in temperature will also alter the timing of diurnal activity patterns of different groups of insects (Young, 1982), and changes in interspecific interactions could also alter the effectiveness of natural enemies for pest management (Hill and Dymock 1989). Quantifying the effect of climate change on the activity and effectiveness of natural enemies for pest management will be a major concern in future pest management programs. The majority of insects are benign to agro-ecosystems, and there is considerable evidence to suggest that this is due to population control through interspecific interactions among insect pests and their natural enemies – pathogens, parasites, and predators (Price 1987). Oriental armyworm, *Mythimna separata* (Walk.) populations increase during extended periods of drought (which is detrimental to the natural enemies), followed by heavy rainfall because of the adverse effects of drought on the activity and abundance of the na-

tural enemies of this pest (Sharma et al. 2002). Aphid abundance increases with an increase in CO₂ and temperature, however, the parasitism rates remain unchanged in elevated CO₂. Temperatures up to 25°C will enhance the control of aphids by coccinellids (Freier and Triltsch 1996). Temperature not only affects the rate of insect development, but also has a profound effect on fecundity and sex ratio of parasitoids (Dhillon and Sharma, 2008, 2009). The interactions between insect pests and their natural enemies need to be studied carefully to devise appropriate methods for using natural enemies in pest management.

Effect of climate change on the effectiveness of biopesticides and synthetic insecticides

There will be an increase in variability in insect damage as a result of climate change. Higher temperatures will make dry seasons drier, and conversely, may increase the amount and intensity of rainfall, making wet seasons wetter than at present. Natural plant products, entomopathogenic viruses, fungi, bacteria, and nematodes, and synthetic pesticides are highly sensitive to the environment. Increase in temperatures and UV radiation, and a decrease in relative humidity may render many of these control tactics to be less effective, and such an effect will be more pronounced on natural plant products and the biopesticides (Isman 1997). Rapid dissipation of insecticide residues due to increases in temperature and precipitation will require more frequent application of insecticides. Therefore, there is a need to develop appropriate strategies for pest management that will be effective under situations of global warming in future.



ANALYSE SCIENTIFIQUE/SCIENTIFIC ANALYSIS

Climate change and pest management: The challenge ahead

The relationship between crop protection costs and the resulting benefits will change as a result of global warming and climate change. This will have a major bearing on economic thresholds, as greater variability in climate will result in variable impact of pest damage on crop yields. Increased temperatures and UV radiation, and low relative humidity may render many of these control tactics to be less effective, and therefore, there is a need to :

- Predict and map trends of potential changes in geographical distribution, and study how climatic changes will affect development, incidence, and population dynamics of insect pests.
- Understand the influence of global warming and climate change on species diversity and cropping patterns, and their influence on the abundance of insect pests and their natural enemies.
- Understand the changes in expression of resistance to insect pests, and identify stable sources of resistance, and pyramid the resistance genes in commercial cultivars.
- Study the effect of global warming on the efficacy of transgenic crops in pest management.
- Assess the efficacy of various pest management technologies under diverse environmental conditions, and develop appropriate strategies for pest management to mitigate the effects of climate change.

Conclusions

Global warming and climate change will have serious consequences on diversity and abundance of arthropods, and the extent of losses due to insect pests, which will impact both crop production and food security. Prediction of changes in geo-

graphical distribution and population dynamics of insect pests will be useful to adapt the pest management strategies to mitigate the adverse effects of climate change on crop production. Pest outbreaks might occur more frequently, particularly during extended periods of drought, followed by heavy rainfall. Some of the components of pest management such as host plant resistance, bio-pesticides, natural enemies, and synthetic chemicals will be rendered less effective as a result of increase in temperatures and UV radiation, and decrease in relative humidity. Climate change will also alter the interactions between the insect pests and their host plants. As result, some of the cultivars that are resistant to insect pests, may exhibit susceptible reaction under global warming. Adverse effects of climate change on the activity and effectiveness of natural enemies will be a major concern in future pest management programs. Rate of insect multiplication might increase with an increase in CO₂ and temperature. Therefore, there is a need to have a concerted look at the likely effects of climate change on crop protection, and devise appropriate measures to mitigate the effects of climate change on food security.

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