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INTER-AFRICAN PHYTOSANITARY COUNCIL CONSEIL PHYTOSANITAIRE INTERAFRICAINMISSION

Workshop on Capacity Building of AU Member States on Integrated Pest Management Strategies and Implementation of IPM for Sustainable Agriculture

Banjul-Gambia, 19th September to 21st September, 2019

REPORT

Group photo

1. Introduction

The Inter African Phytosanitary Council of the African Union (AU-IAPSC) in collaboration with the Government of the Republic of the Gambia organized a workshop on Capacity Building of AU Member States on Integrated Pest Management Strategies and Implementation of IPM for Sustainable Agriculture. The event took place from 19th to 21st September 2019 in Banjul - Gambia with participation of delegates from 14 Member States (Annex1). The workshop was in line with AU-IAPSC's approved 2019 program budget. It not only provided the participants with updated information and countries' practical experience in IPM, but also provided an opportunity to review concepts and principles of IPM, share experiences among participating Member States as well as to discuss opportunities and challenges for production and sustainable application of IPM in the context of IPM strategies.

This workshop introduced participants to multiple aspects of IPM: policy and procedure; preventing infestation; trapping and monitoring; remedial treatment; basic pest identification. IPM is designed for NPPO staff and those at institutions which need to establish or improve an IPM program but would be useful for anyone wanting to refresh basic IPM knowledge. Familiarity with concepts was developed through a combination of presentations, discussions and recommendations. Integrated Pest Management is now considered an essential component of a well-rounded preventive care policy. Preventing pest damage is better for collections and, over time, more cost effective than treating an infestation.
The objective of the workshop was to discuss the Integrated Pest Management concept, to promote regional cooperation in sustainable agricultural production and to identify the gaps in the mentioned fields in each country. IPM is considered as one sustainable approach for crop production and protection and as such is being mainstreamed in AU-IAPSC's activities.

2. Opening ceremony

The ceremony was marked by two speeches:

3.1. Welcome remarks

The Director od AU-IAPSC, and AU Permanent Representative in Cameroon, Mr Jean Gerard MEZUI M`ELLA, gave the welcome remarks by welcoming the participants to the workshop. He noted that the improper use of pesticides not only causes health problems for farmers and Consumers, but also raised environmental concerns such as water and soil contamination. Moreover, pests can develop a resistance to pesticides leading to the need of greater doses of the pesticides or application of new ones. IPM is the effective method that can help decrease the use of pesticides. He further stated that production and utilization of IPM options require specific technical knowledge and skills. One of the main objectives in organizing this training workshop was to provide the participants with updated information and experience of some AU Member States, as pioneer countries with long-standing expertise in IPM. In addition, the workshop also provided good opportunities for participants to share their technical know-how and experience, and to strengthen the cooperation between member states. The Director further expressed his

gratitude to the Government of the Republic of the Gambia for accepting to host the Workshop on IPM and to the people of the host country for their hospitality.

3.2. Opening speech

Mr. Landy Sonko, Director of Plant Health Services (NPPO) in the Gambia, welcomed all participants and apologized for the absence of the honorable Minister for agriculture. He noted that the topic of IPM is of prime importance for crops production and productivity and also that food security is very important to the people of the Gambia. Subsistence and commercial farming in the country is supported with IPM Practices to enhance crops production and productivity. He wished participants a fruitful meeting and said that he looked forward to constructive recommendations, fruitful deliberations and sustainable development of IPM before declaring, on behalf of the Honourable Minister of Agriculture of the Republic of the Gambia, the workshop officially open.

3.3.Self-introduction

Participants to the IPM workshop introduced themselves.

3.4. Group photo

Participants took a group photo at the Baobab Holiday Resort.

3. Presentations

4.1.Adoption of the Agenda and Election of the Bureau

4.1.1 Adoption of the agenda

The agenda of the workshop was adopted with little modifications (Annex2)

4.1.2. Election of the bureau

The following were elected:

Chaiperson: Mr. Landy Sonko from the Gambia

Raporteurs: Mr.Nana Sani and Ms. Chipiliro from AU-IAPSC

4.2. Justification and expected results of the workshop

In her presentation, Ms Luiza Munyua, AU- IAPSC`s Senior Scientific Officer –Phytopathology, discussed pest challenges in Africa, the difference between pest control and management, the justification of pest management strategies which are based on biological, chemical, cultural practices, prevention of pest introduction and spread and IPM. She emphasized that pest management methods should fit well within an effective IPM strategy for improved food security and food safety, environmental health and sustainable incomes.

She also presented the expected outcomes/results of the workshop which included:
(1) Pest status in the AU Member States;
(2) Status of Integrated Pest Management Strategies in MS;
(3) Main constraints and prospects for implementation of IPM in pest management ;
(4) Regulatory framework for use and uptake of IPM strategies;
(5) Capacity building and Implementation of IPM for Sustainable Agriculture in MS;
(6) Member States reports on the updated status of IPM for NPPOs under Save and Grow in Africa;
(7) Strategies to follow up continued support of IPM development, application and adaptation by AU Member States;
(8)Documentation of successful cases of empowerment through IPM and training for NPPOs officials;
(9) Set up a Pest Management Network
(10) Workshop Recommendations for AU-IAPSC and MS, Harmonization and Adoption of Recommendations and Workshop Proceedings and Report.

4.3. Inputs of basic integrated pest management strategies for sustainable agriculture

In his presentation, Prof. Ahmed Hussein El-Heneidy discussed issues pertaining to: Potential adverse effects of pesticides, Economic Threshold Levels, Introduction to IPM, Major components of IPM, IPM in Developing Countries, IPM`s Location-Specific, Participatory Approach to IPM Development, Insect Pest Management Research and Extension, Extension Approach for IPM and Socio-economic Factors. For Potential adverse effects of pesticides, he mentioned some of the effects which include: reduction of beneficial species, drift of sprays and vapor, residues in food, ground water contamination, resistance, poisoning hazards and other possible health effects. Cconcerning the Economic Threshold Levels, he defined the different terminologies like the Equilibrium Level (EL), Economic Threshold Level (ETL), and Economic Injury Level (EIL) to be considered in an IPM programme.

Prof Ahmed Hussein further defined IPM / IPC as a dynamic program specific to crop, location, and season that combines all available, compatible tactics to help grow healthy plants. It is a broad-based approach that integrates practices for economic control of pests with aims to suppress pest populations below the economic injury level (EIL). IPM is a system that imparts profit, safeguards environmental and human health, encompasses cultural sensitivities, and ensures social acceptance and has been well accepted by scientists, extensionists, environmentalists, policy-

makers and the public. The goal of IPM is not necessarily to eradicate or eliminate pests, but to strengthen and stabilize the landscape (ecosystem) so that conditions are favorable for plants but unfavorable for pests. IPM interest was defined as an integrated system of the agricultural practices in a specific site that is lasting over the long term. This system should satisfy human food and fiber needs, enhance environmental quality. IPM being an ecosystem-based strategy, he encouraged that IPM strategy should be focused on Prevention of pests, Monitoring and Scouting and Suppression of pest population and control action. It is important to mention that pests and diseases monitoring is a fundamental first step in creating a proper integrated pest management (IPM) program. He also highlighted that prevention of pests included: monitoring, pest forecasting, prediction, identification, scouting and monitoring. For the suppression and control actions, Prof. Ahmed Hussein advised the control tactics used in integrated pest management which include pest resistant or tolerant plants, and cultural, physical, mechanical, biological, and chemical control. Concerning the Major Components of IPM, his advice included: host plant resistance, cultural control, biological control, legislative control, mechanical control and chemical control.

Prof. Ahmed Hussein further developed the principles of IPM which comprise: proper identification of damage and responsible "pest and beneficial organisms before taking action; establish monitoring guidelines for each pest species; learn pest and host life cycle and biology; monitor or sample environment for pest population; establish action threshold (economic, health or aesthetic); choose appropriate combination of management tactics and monitor, evaluate and document the results before emphasizing on the IPM seven critical steps; (1) Inspection (The cornerstone of an effective IPM program is a schedule of regular inspections); (2)preventive Action;(3) identification. (4) Analysis; (5) treatment Selection; (6) monitoring and (7) documentation.

4.4. IPM Strategies

Thomas Dubois from ICIPE made a presentation on making IPM work in sub-Saharan Africa with fall armyworm and fruit flies as selected case studies. In his presentation, he gave general information about ICIPE which is an intergovernmental organization, charter signed by 13 countries worldwide with the Headquarters in Nairobi, Kenya. He noted that ICIPE is a Centre for excellence in Africa which Entry point is insects, unique in the world. More than 530 staff from about 40 nationalities work in the organization and 150-180 students graduate annually from there. It has about 300 partners worldwide.

Moreover, ICIPE operates under the 4H paradigm: plant, animal, human and environmental health. As such, research work is split into four themes: human health, animal health, environmental health and plant health. He further highlighted that 75% of agricultural crops rely on arthropod pollination to produce quality yields and the area is hugely under-researched worldwide.

Thomas Dubois noted that, in Plant Health: staple crops IPM, horticultural crops IPM, industrial crops IPM, push-pull technology, invasive pests, insects for food and feed are key areas for research. He stated that ICIPE carries out research into insects for food and feed and, it has truly morphed into a giant. The approach of one health paradigm is considered for all these themes coming together as much as possible, looking at the landscape level, where animal, human, environmental and plant health come together.

Concerning fruit flies He mentioned that; the best case of IPM case developed at icipe for the case of fruit flies true IPM project, with many technologies coming together combatting the pest includes: Monitoring, parasitoids, orchard sanitation, biopesticides, male annihilation, bait spray,

postharvest. Cultural control is the basis for us. Lessons learnt of icipe's fruitfly IPM program was that; knowing the pest is a critical first step in IPM and the taxonomy for fruit flies is big problem. The icipe`s first IPM management tool for invasive pests is classical biological control.

The goal of classical biocontrol was to go back to area of origin, in this case Sri Lanka, find coevolved natural enemy and introduce into invaded area, Africa. He noted that Research cost and regulatory costs are very high, but when it works, costs for farmers are zero.
For capacity building and awareness, He advised that it is only and only when you know what works, and how much it cost can you meaningfully engage in these. He emphasized that

Capacity building is hands-on training of extensionists, demonstration gardens, manual, translating manuals in local languages for farmers.

For fall armyworm, Thomas Dubois stated that, it is not the only Spodoptera in Africa. In fact, He mentioned that there are 9 Spodoptera in Africa, with recently a 10th one reported from Cameroun, Benin, and Gabon namely S eridania of which 4 of those Spodoptera are economical pests in Africa. S. exigua is an invasive species itself. All are kept under check by potent NPVs and a range of parasitoids. So likely, population densities of the fall armyworm will also adjust to lower levels over time because of parasitoids and NPVs.

4.5. Countries' presentations

Each country participant presented a brief country background, national pest status, the Status of Integrated Pest Management Strategies in the country; the main constraints and prospects for implementation of IPM in pest management; the regulatory framework for use and uptake of IPM strategies and capacity building and implementation of IPM for Sustainable Agriculture. The summary of these presentations are found in (annex3). It was noted that IPM has become an important part of practice of pest management strategies in participating countries with diverse progress made at certain areas, i.e. specific target pest and crops based on local realities. A number of successful IPM practices which were funded and coordinated by the FAO TCP were observed. It was noted that the main pillar of sustainable IPM is the availability of funding without which noting could be effective.

5. Recommendations

Recommendations made during the three day workshop on IPM included the following:

1. Member States to put in place information-sharing mechanisms with farmers and among themselves for successful implementation of IPM for sustainable agriculture;
2. AU-IAPSC in collaboration with ICIPE, CABI, IITA and other relevant stakeholders to develop a consistent and holistic roadmap for IPM implementation in Africa (fall armyworm, fruit flies, striga, tomato leaf miner) by 2021;
3. Member States to develop effective monitoring, evaluation and review systems for IPM strategies in accordance with AU-IAPSC and IPPC framework by 2021;

4. Member States to consider adapting and or establishing plant health clinics to allow diagnosing pest problems, acquire expertise and get solutions in IPM;
5. Member States to consider developing and disseminating practical field guidelines in the local languages to assist in IPM strategies;
6. Member States to highlight IPM in relation to 2020 International Year of Plant Health;
7. Member States, through NPPOs, to undertake a comprehensive review of scientific information in relation to IPM and pesticide management;
8. Member States to establish economic threshold level (ETL) for pests of economic importance in accordance with ISPM5 guidelines;
9. Member States should establish pesticide regulatory frameworks and
10. Member States to establish public private partnerships (PPP) to ensure IPM tools are available and affordable.

6. Closing ceremony

After the 3 days of intensive work on IPM with fruitful deliberations and recommendations, the Director of AU-IAPSC thanked all participants for their effective and efficient contribution to the success of the workshop. He stated that; considering that the knowledge of and skill in protecting crops against pests and diseases have improved greatly over centuries and that the advance in science and technology, particularly during the 20th century, changed into new approach to pest and diseases management, we must recognize that pesticides misuse can potentially create serious problems in tropical climatic conditions and promote IPM practices. He assured participants that AU-IAPSC endeavours to implement all recommendations directed to her.

The second speaker was Mr. Landy Sonko, Director of the Gambia plant protection services, who on behalf of the Honorable Minister of Agriculture, thanked ICIPE and the expert from Egypt for their brilliant presentations. He urged Member States to develop their National IPM strategies. He further thanked all participants for their hard work, and the Director of IAPSC for choosing the Gambia to host the workshop before wishing safe journey to their respective countries and destinations. He finally declared closed the workshop.

Annex1. **Summary of countries presentations**

Table 1: summary of countries` presentations

no	Country	Country background	Pest status	Status of IPM strategies	Main constraints of IPM in pest management	Regulatory framework of IPM strategies	Capacity buildings and implementation of IPM
1	Burkina Faso	The Country plant pest surveillance (CNLCFA) with the 2015 Ministerial order include : 13 pest control regional committee; 45 provincial pest control committee 352 alert phytosanitary units; 13 plants pests surveillance and control units.	The country works with FAO to ensure implementation of IPM program.	Use of cultural techniques, Physical and mechanical methods, Biological control methods,	Many farmers are still using pesticides to control pests; Pest resistance	The departmental order on IPM needs to be updated.	The program has trained a total of 27 000 farmers, including 14% of women through its network of schools fields of producers in the 13 regions of the country. The training is mostly concentrated on the production of rice, vegetables, cowpea, fruits and cotton.
2	Egypt	Many crops are grown in Egypt	fruit flies, scale insects; Sugar-cane borer, *Sesamia cretica* L. infestation).	IPM strategies in Egypt: Cultural Control Host Plant Resistance Mechanical control Applied Biological Control Legislative Control Chemical Control	Compliance with standards required for export markets	Since the 1990s, the Ministry's policy has adopted the implementation of integrated pest management programs in many different crops, such as cotton, maize, rice, reeds, citrus, and others.	Successful Applied Programs of IPM in Egypt Case Study 1: in Cotton Case Study 2: in Maize Case Study 3: in Citrus
3	Gambia	Land area: 11,295 km² Population; about 1.9 Million	Endemic pest: -African armyworm(*Spodoptera exempta)*	2016-2018 a TCP on the management of the spiraling white fly TCP/GAM/2602.	Lack of funds to continue providing	-No specific IPM policies in place; -PPS serves as the technical	-Training of trainers for extension staff/SMS and

		Agriculture provide 70% of work force And constitute 28% of GDP. Ratification of IPPC in 2016	-Red spider mite (Tetranychus urticae) -Tomato boll worm (helicoverpa armigera) -Rice Blast (Pyricularia *oryzae*) -Aflatoxin (Aspergillus *flavus)* **Alien pest:** -Fall armyworm(Spodoptera frugiperda) -Spiralling whitefly(Aleurodicus dispersus) -Fruit flies (Batrocera invadens) -Cassava mealybug (Phenacoccus manhoti)	components of this TCP : Surveillance, Integrated Pest Management Objective of the TCP: train research, extension staff and farmers on IPM, conduct surveillance and bio-control activities. 2014 to date, PPS was contracted by the *Nema* project to implement Integrated Production and Pest Management (IPPM) Farmer Field School (FFS) program on rice and vegetable.	support to farmers. There are 25 rice and 25 vegetable FFS across the country with 25 or 30 members per school. Each school receives farm inputs and tools Gained importance especially with the cultural and use of botanicals	institution for advice and implementation of IPM for both government and farmers. -New regulatory instruments (Plant Health Bill) developed indicates the role of PPS in implementation of IPM strategies in the country	extension FFS facilitators -Step down training for farmer FFS facilitators -Weekly meetings with FFS members to discuss production, GAPs and pest problems through AESA. -Adoption of GAPs and pest management Membership is both male and female farmers with priority for youth
4	Ghana	TCP/GHA/4553-Rice IPM.	Several environmental and agronomic problems (weeds, declined soil fertility, diseases, insects and vertebrate pests) are considered major constraints to crop production.	ICPM/FFS Training TCP/GHA/4553-Rice IPM at Dawhenya.	Insufficient financial support of the IPM program Budgetary constraints	Plant protection act	Fifty (50) farmers were trained at each of the five sites. In 1995, a total of 325 farmers were trained in IPM in Ghana

5	Liberia	Independence: July 26, 1847 Location: West Africa; bordered by the Atlantic Ocean, Sierra Leone, Guinea, and Cote d'Ivoire. Official Language: English Population:4.3 million Tropical rainfall with heavy and sustain sun heat Main crops: rubber and oil palm plantations, cash crops (cocoa, coffee, sugarcane, coconut, banana and oranges); Percent of National economy: 42.2% of real GDP (2008); Livelihood Activity: 70% of overall population	No list of pest developed	The national government is not directly involved in the application of agro-chemicals or biological control implementation. But regulates and informed applicators or users of both biological and chemical agents along with Environmental Protection Agency (EPA) and the Ministry of Health.	Food Insecurity Rudimentary food value chains widespread Unemployment and poverty Poor infrastructures (laboratory facilities, industries, roads, electricity and irrigation practices) Weak land management and water control systems Limited market access and linkages Low capacity and manpower (due to brain drain and training ability) Out-dated agricultural research and technology dissemination systems. Lack selective agricultural crops and livestock production	No regulatory framework on IPM but Liberia does rely on ISPM and other standards to operate	No training on IPM has been undertaken in the country.

					system in the vary countries. Inadequate linkages of farmers and investors to economic sustainability		
6	Zimbabwe	Antestia bug *(Antestiopsis* spp.), Coffee Fruit Fly *(Ceratitis coffeae)* Coffee Giant Looper *(Ascotis selenaria)* Stem rot *(Phytophthora* sp.*)* and root rot *(Botryodiplodia thoebromae);*	Core Step of IPM: Prevention, Observation and Intervention. Measures in IPM: Cultural Measures Biological Management Plant Quarantine measures Legislative Measures Host Plant Resistance and Genetic Modification Deployment of Plant Protection Products Economic Injury Level Environmental Protection	Extension officers train farmers on IPM measures. Commercial farmers implement different IPM methods to mitigate pest problems.	Insufficient financial resources and technical resources	Legislative measures on IPM do exist but need to be updated	Training program on IPM are on going

7	Namibia	Namibia's population is estimated at 2.49 million, with growth rate at 1.89% (2019). Total land area is approximately 824 000 km² of which 687 400 km² (83.5 percent) is considered to be available for agricultural land use. Almost 1.2 million people in about 206,000 households live on farmland. Agricultural activities involve mainly crop farming and livestock production	Fall Army Worm *(Spodoptera frugiperda)* *Tomato Leaf miner (Tuta absoluta)* Fruit fly *(Bactrocera dorsalis)*	Extension advisory services train farmers Most of Large Scale Farmers mainly use Chemical pesticides to control pests and diseases Small Scale farmers use cultural (weed control, crop rotation) and mechanical (hand picking, egg destruction) control methods and Conduct pest scouting regularly and monitoring through use of Pheromone traps.	Change of minds for farmers to reduce the use and dependence on chemical pesticides Acceptance of reduction of use of Chemical pesticides by Agricultural chemical dealers Limited financial resources.	Legislative to support IPM in place	Capacitate Technical staff on IPM strategies Create awareness about IPM among farmers Conduct Farmer Field Days to train farmers Design an IPM packages that are pest specific Financial support for IPM implementation.
8	Uganda	The agriculture Sector provides over 20% of GDP, generates 48% of the export earnings and Provides livelihood support to 80% of households. The Uganda strategic plan focus crops:Tea, coffee, banana,	Cotton: African bollworm (*Helicoverpa armigera* The lygus bug (*Lygus simonyi* Cotton bacterial blight (*Xanthomonas citri pv. Malvacearum)* Fusarium (*Fusarium oxysporum f.sp vasinfectum*) Verticlium (*Verticillium dahliae*) leaf spots Alternaria (*Alternaria macrospora*) Cercospora (*Cercospora gossypina*).	Coffee wilt disease CWD) &: Managemment strategies (M.S) Cultural and chemical options uproot affected plants and surrounding ones Infection more than 70 % uproot all and burn Restrict movement of affacted plants and products disinfect farm tools using Jik 5%, avoid cross contamination Plant resistant varieties fallow period of 6 months - 2 years before replanting,	Mission-Transform subsistence into commercial agriculture will render some of the IPM strategies inapplicable, IPM is absent on the sector plans,	Plant Protection and Health Act, Seed and Plant Act, Agricultural Chemical Control Act, NOT EXPLICTLY ELABORATED.	Decision tools required to implement IPM, More resources needed in sector strategic plan Implement IPM, Develop effective partnerships and relationships with stakeholders including private sector, Policy framework to counter the risk

		cotton, cassava, potato, maize, rice, beans and Fruits and Vegetables, Control and management of crop pests Targets endemic and emerging pests and diseases -800 pests/diseases to keep away (emerging/quarantine) -Over the last 10 years invasions have been noticed.	Coffee: Coffee wilt, (*Giberella xylaroides*) coffee leaf rust (*Hemileia vastatrix* Coffee berry disease (*Colletotrichum kahawae*) Coffee black twig borer (*Xylosandrus compactus*)) Bananas Banana root borer (*Cosmopolites sordidus* Black sigatoka *Mycosphaerella fijiensis* Banana xanthomonas wilt *Xanthomonas campestris pv. musacearum* *Radopholus similis,* *Pratylenchus goodeyi* *Helicotylenchus multicinctu*s *Meloidogyne* spp Panama disease (*Fusarium oxysporium f.sp. cubense* (race 1&2) Cassava Cassava mosaic virus (CMV) Cassava brown streak virus (CBSD) cassava green mite (Mononychellus tanajoa Corn Stem borers (Busseola fusca and Chilo partellus) Fall armyworm (*Spodptera frugiperda*) Maize weevil (*Sitophilus zeamais*) Maize streak virus and maize lethal necrosis Turcicum leaf blight (*Exserohilim turcicum*)	painting out stems and branches with copper based fungicides Coffee leaf rust & M.S: Prunning to reduce moist conditions in the field, Regular stumping, good weeding and soil fertility management, Application of copper based fungicides every 3 weeks starting with onset of rains Or spray with curative /systemic fungicides underside of leaves Banana Bacterial wilt &M.S: Early removal of male buds, (2 weeks after emergence), Use of clean planing materials, Soil fertility management, cultural practices (desuckering, mono cropping, detrashing, mulching and soil and water conservation), Panama disease & M.S: Sanitation (removal of affected plants, provide adequate drainage, use of compost manure), Use of pathogen free planitng materials Black sigatoka &M.S: Use of resistant cultivars, cultural practices that reduce humidity in the crop, soil fertility management. Banana weevil &MS: Field sanitation , Planting health materials, Hot water treatment of clean suckers,	Capacity for implementation of IPM, Decision making of IPM strategies is not justified? Except by research.		of commercialization, Strong advocate for IPM in policy, legislation and regulatory framework and strategies, ICT in pest management, Appropriate extension approaches.

			Gray leaf spot *Cercospora zeaemaydis* and *Cercospora sorghai var. maydis*) Ear rots (*Sternocarpella maydis*, F. *graminearum and F. verticillioides*) Striga (*Striga hermonthica and S. asiatica*) **Rice:** striga (S. *asiatica and S.hermonthica*) Rice yellow mottle virus Bacterial blight (*Xanthomonas oryzae pv.oryzae)* Rice blast (*Magnaporthe oryzae*) Birds (chestnut Munia and the Eurasian tree sparrow) Beans: Angular leaf spot (*Phaeoisariopsis griseola)* Anthracnos *Colletotrichum lindemuthianum* Bean leaf rust *Uromyces appendiculatus* Bacterial blight (*Xanthomonas axonopodis pv. phaseoli*) Halo blight *(Pseudomonas syringae pv. Phaseolicola*) Bean common mosaic	application of neem powder to reduce weevil numbers, use of pesticides Cotton boll worm &MS: Trap cropping with marigold, Use neem tree extract as spray and other organic pesticides, Pheromone trapping Cassava brown streak &M.S: Plant disease free planing materials, Resistance/Torelant materials; Field sanitation, Early harvesting, Control the vector (Whiteflies) Cassava mosaic virus& MS: Host plant resistance use clean planing materials avoid symptomatic plants wher selecting planting materials			
9	Cameroon	Major crops produced in Cameroon include: Cash/industrial crops: cocoa, coffee, cotton, banana, tea, rubber, palms, etc Other crops: maize, rice, sorghum, cassava, irish potato, sweet	Fall Army Worm (Spodoptera frugiperda) maize stem borer (Busseola fusca) Fruit flies (Bactrocera & Ceratitis) Cocoa capsid (Sahlbergella singularis) White flies (Bemisia tabaci) eggplant fruit borer (Leucinodes orbonalis) Leaf miner (Liriomyza trifolii) southern root-knot nematode (Meloidogyne incognita)	IPM strategies: Resistant varieties: maize varieties CMS 8704, CMS 8501, developed to resist maize streak virus; cassava vars torent to CMV Mechanical/Physical methods: green houses, anti insects mesh, Cultural controls: crop rotation, Biological controls: use of mycorrziha fungi to control germination of striga seeds ; use of pheromones traps to control fruit fly in mangoes;	Poor interactions between main stake holders ; (MINADER, IRAD, CropLife, etc) ; Low avialability of IMP solutions in the country, lack of plant	The Decree 2005/770/PM of 6th April 2005 A flexible regulatory framework for the production and use of biopesticides; The decree 2005/118 organising the ministry of	Case study of IPM on cocoa in Cameroon

		potato, tomatoes, pineapple, beans	Maize streak virus **;** Maize stripe virus Phyllosticta maydis **;** Sclerospora graminicola (maize mildew) Mildew bacterial wilt of solanaceous crops (Ralstonia solanacearum) Tomato mosaïc virus Fusarium moniliforme Cassava Bacterial Blight (Xanthomonas axonopodis) African cassava mosaic virus (ACMV), East African cassava mosaic virus (EACMV) Coleoptera -scotylidae, platypodidae banana borer weevil (Cosmopolites sordidus) banana aphid (Pentalonia nigronervosa) banana root nematode (Radopholus similis) cassava mealybug (Phenacoccus manihoti) Bemisia tabaci (white fly) cassava root mealybug (Stictococcus vayssierei)	Chemical controls: more than 1000 phytosaniatry products registered as insectides, herbicides, fungicides, nematicides and raticides.	health clinics and insufficient plant health specialists; Lack of trained staff and appropriate testing and diagnostic facilities; Lack of local investments to manufacture biopesticides	agriculture has created the service of promotion of IPM. The country has regulations that can be used to develop IPM strategies.	
10	DRC	Area: 2.345.410 Km2 Arable land : 80 million ha Agriculture provides 80% labor DRC has 240 entry points.	Main pests : fall armyworm, Tomato leaf Miner, banana bunchy top disease, Cassava Brown Streak	IPM programme : IPM on African Cassava Mosaic virus IPM on coffee Tracheomycose IPM on banana wilt IPM action on Cassava Brown Streak IPM strategy in DRC: ⎫ Biological control, Push and pool method, Trapping, Surveillance, Pest Rapid alert system Chemical control	Less qualified staff, Limited financial and material resources	Legislation in place but need to be updated	Enhance capacity of all stakeholders on IPM practices

				Cultural control			
11	Sudan	Sudan is a very big country, even after separation of South Sudan the area is still big (1882000 km2) Sudan is surrounded by eight countries: Egypt, Libya, Chad, Central Africa, South Sudan, Ethiopia, Eritrea and Saudi Arabia, accordingly, too many entry points are scattered on this very long border. Population: 33.4 million Peoples, Growing at the rate of 2.46%, Rapid Urbanization, Youth Population. Federal System: 18 States.	Sorghum bug (Andat) *Agonoscelis spp*. Melon bug (*Cordius viduatus)* Fruit fly (*Bactrocera invadens)* Date palm green scale (*Plasmaspis phoenicis)* Sesame Seed Bug (*Elasmolomus sordidus)* Tomato leaf minor (*Tuta absoluta*) Green Pit Scale Insect (*Plasmaspis phoenicis*) Water hyacinth (*Eichhornia crassipes)* Mesquite *Prosopis chilensis* Fall armyworm (*Spodoptera frugiperda*) Faba Bean Broomrape (*Orobanche crenata)*	Legislative Control. Cultural Control. Mechanical & Physical Controls. Behavioral Control. Biological Control. Chemical Control. Biotechnological Control Methods: Quarantine measures:	The current Situation is scattered and did not include a particular unify strategy or action plan between countries for IPM; No national strategy or Action Plan exists to expected due to climatic change for a adopt performance of existing IPM programs in the countries. Lack of IPM awareness at all levels; Lack of closely cooperation and coordination between stakeholders; Lack of finance to support IPM programs; The livelihood Community is not involved	Locust Control Act 1907. The Plant Diseases Act 1913. Agricultural Pests Control Act 1919. Cotton Ordinance 1926 & 1929. Water Hyacinth Control Act 1960. The pesticides and pest's control products Act 1974, amended 1994. Plant Protection Bill of Sudan, 2001, 2012.	Ccontrol programmes are carried out through regular campaigns for surveying and controlling these mentioned pests in the specific period in seasons of each pest occurrence. PPD manages and supervises the plant quarantine stations all over the country; PPD manages and approves imported chemicals through implementation of pesticides and pest's control products legislation; Together with States plant protection departments all efforts are integrated to combat plant pests and diseases.

					in IPM program; Not all introductions of IPM are risk based.		
12	Benin	West African country; Area: 114.764 km 2 Population: 10.741.458 habitants Increase rate: 2, 77 % / an Agro ecological zones: 8 Average T: 22 à 34°C Food crops: maize, rice, yams, cassava mango etc. Cash crops; cotton, pineapple, cashew soya bean, timbers	Frut flies, (*Bactrocera dorsalis, Ceratitis cosyra*) Fall army worm (Spodoptera frugiperda) ,Quelea quelea	ECOWAS fruit fly IPM projet Cultural techniques Biological control, chemical control FAW IPM project For Quelea quelea use of Nets and physical control.	Synergy of coordination of IPM programmes not very efficient; monitoring and evaluation of IPM programmes with development of new orientations not done; Insufficient human, material and financial resources to carry out IPM programmes	Legislation and regulatory framework in place but need to be updated.	Enhance capacity on human, material and financial resources, Promote awareness creation on IPM and strengthen institution and update regulation on IPM in the country.
13	RCA	Agriculture constitute 54% GDP Main crops: cotton, coffee, oil palm, sugarcane,	Bacteria disease, root rot, CMD, Maize streak, Maize Lethal necrosis, Tomato leaf miner, aphids, cassava mealybug, termite, fall armyworm.	FAO TCP on FAW in the pipeline, FFS PNUD, BM, FIDA and the government of CAR to develop an IPM programme to mitigate pests	Insufficient qualified staff, Limited knowledge on IPM	Regulatory frame work is less developed	The country has not yet master the IPM enhancing capacity of farmers as well as all stakeholders

		cassava, sorghum, millet, rice, peanut, maize, vegetables, fruit trees,			Weak plant protection legislations and regulations Weak pest surveillance Insufficient communicatio n and sensitization on IPM Limited funds		remains imperative
14	Tunisia	Tunisia arable land: 10.5 million Ha (65% of total land) Agriculture contribution 8.15% GNP National export: 9.17% Investment 8% Employment 16.3%	Yield loss due to pests: Wheat 50%, cotton 80%, Soya bean 25-29%. Corn 31%, Rice 37%, potato 40%	Tunisia has several IPM programmes: IPM programme on fruit fly for fruit trees; IPM programme on live tree; IPM program on tomato leaf miner and cereal pests IPM on grenadier and other crops. IPM strategies: Pest Surveillance using traps Chemical control Biotechnological control Physical and biological control Cultural control and use of bio pesticides.	Resistance of bacteria to bactericides, insects to insecticides and weeds to herbicides	Appropriate regulatory framework on IPM and plant protection	Study on population, Dynamic is essential. Training of trainers on IPM issues.

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