



Partnership  
for Aflatoxin  
Control in Africa

Partenariat pour  
lutter contre  
l'aflatoxine en Afrique

Parceria para o  
Controle da  
Aflatoxina em África

الشراكة من أجل مكافحة  
الافلاتوكسين في أفريقيا

# Aflatoxins: Impact on Livestock and Livestock Trade

ALiCE 2013, 26-28 June 2013

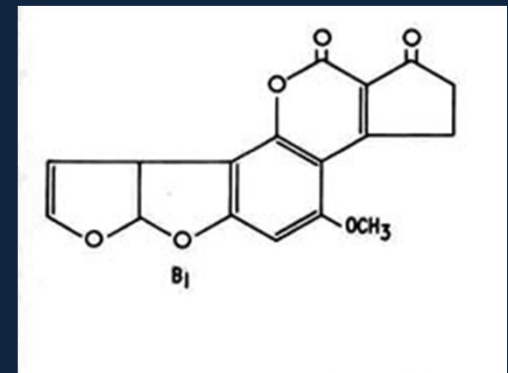
Amare Ayalew (PhD)

Plant Pathologist/Mycotoxicologist, PACA

# What are aflatoxins?

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- Fungal metabolites (naturally occurring)
- Produced by strains of *Aspergillus flavus* and *A. parasiticus*
- Toxic to humans and animals
- Highly stable compounds, withstand normal food/feed processing procedures



# Aflatoxin contamination

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- Occurs preharvest, harvest, storage
- Maize, groundnut, cottonseed and byproducts are highly susceptible but occurs in wide ranging food and feed
- Grass, silage and hay do not contain appreciable levels
- Influenced by drought stress and high temperature, insect damage, and improper harvesting, drying and storage

# The Aflatoxin Challenge in Africa

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## 1. Agriculture and Food security:

aflatoxin affects several African staple crops, contaminated food is likely to be consumed by smallholder farmers and their families

25% of the world food supply is contaminated with aflatoxins (FAO, 2000)



[www.ipm.iastate.edu](http://www.ipm.iastate.edu)

# The Aflatoxin Challenge in Africa

**2. Health:** aflatoxin is linked to cancer, immune-system suppression, growth retardation, liver disease, and death in both humans and domestic animals.

4.5 billion people chronically exposed  
(WHO, 2004)

**3. Trade:** aflatoxin undermines efforts to streamline SPS issues continent-wide

64% reduction in food quality in Africa  
(WHO, 2001)



[www.ipm.iastate.edu](http://www.ipm.iastate.edu)

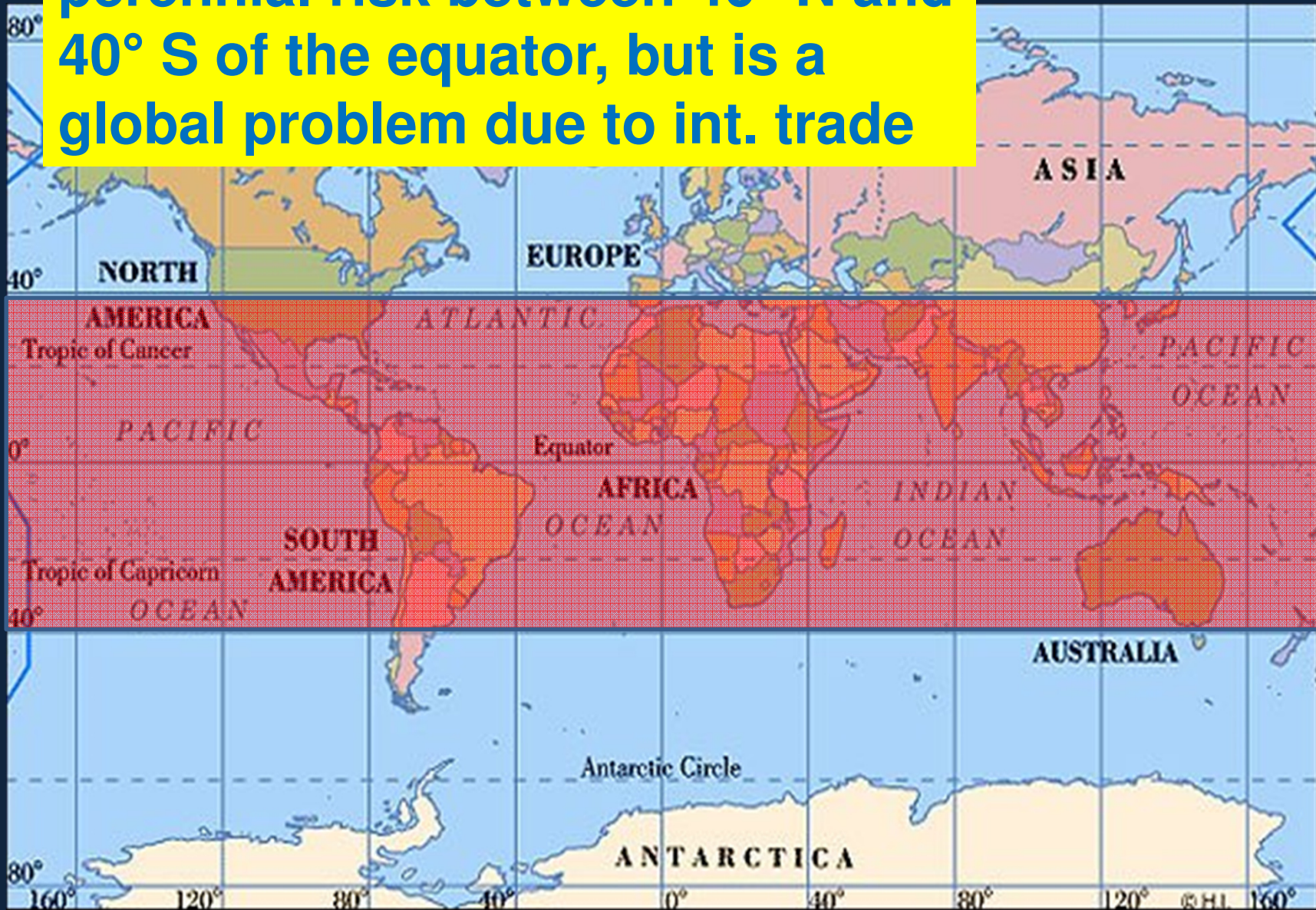
# Factors in the Aflatoxin Challenge in Africa:

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- Conducive climatic conditions
- Traditional crop production practices
- Inadequate harvesting, drying and storage practices
- Policy and institutional capacity
- Lack of awareness



**Aflatoxin contamination is a perennial risk between 40° N and 40° S of the equator, but is a global problem due to int. trade**



# Effects of aflatoxins on animals

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- Exposure to moderate to high levels of aflatoxins in feed leads to mortality and morbidity (Acute toxicity) – the major organ affected is the liver
- No animal is immune to the acute effects of aflatoxins



[www.icrisat.org](http://www.icrisat.org)



# Effects of aflatoxins on animals

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- Low dietary concentrations lead to (chronic effects):
  - Decreased milk and egg production
  - Poor weight gain
  - Recurrent infection due to immunity suppression
  - Reduced fertility, abortion, and lowered birth weights

# Effect of aflatoxins on livestock sector

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- Productivity of the livestock industry is seriously affected by aflatoxins
- E.g. Production losses to the U.S. poultry and swine industries exceed \$100 million per year
- Aflatoxin regulations restrict flow of animal feed
- Export of dairy, meat and fish products is increasingly subject to aflatoxin testing

# Levels of AFT occurrence in feed in Africa

<b>Commodity</b>	<b>Country</b>	<b>Incidence</b>	<b>Range (µg/kg)</b>
Animal feeds	Kenya	703/830	0.9-595
Animal feeds	Sudan	36/56	4.1-579.9
Animal feeds	South Africa	99/108	3.2-950
Cottonseed meal	South Africa	60/60	13.4-75.7
Poultry feed	Morocco	14/21	0.05-5.38
Poultry/livestock feeds	Nigeria	1/2	0.0-67.9

Source: Adapted from Anthony et al. (2012)

# Levels of AFT occurrence in high aflatoxin-risk crops in Africa

Commodity	Country	Type of Aflatoxin	Incidence	Range ( $\mu\text{g}/\text{kg}$ )
Groundnut	DR Congo	AFB1	43/60	1.5-937
	Kenya	AF	170/769	0-7525
Maize	Nigeria	AFB1	55/55	0-1874
	Uganda	AF	22/49	1.00-1000
Cottonseed	Nigeria	AFB1	3/8	0.0-271

# Occurrence of aflatoxins in livestock products in Africa

Commodity	Country	Type of Aflatoxin	Incidence	Range (µg/kg)
Cheese	Libya	AFM1	15/20	0.11-0.52
Cow Milk	Sudan	AFM1	42/44	0.22 – 6.90
	Kenya	AFM1	474/613	0.005-0.78
	Cameroon	AFM1	10/63	0.006-0.527
	South Africa	AFM1	98/114	Max: 2.07
	South Africa	AFM1	85/85	Max: 2.48
Egg	Cameroon	AF	28/62	0.002-7.68
Smoke dried fish	Nigeria	AFB1	11-Nov	1.505-8.11

Source: Adapted from Anthony et al. (2012)



# Aflatoxins and Trade: Regulations in the world

Category	Aflatoxin level (ppb)		Nr of countries
	Median	Range	
B1 in foodstuffs	4	0-30	33
B1+B2+G1+G2 in foodstuffs	8	0-50	48
B1 in foodstuffs for children	0.3	0-5	5
M1 in milk	0.05	0-1	17
B1 in feedstuffs	20	5-1,000	19
B1+B2+G1+G2 in feedstuffs	50	0-1,000	21

Adapted from  
Dohlman (2003)

# Aflatoxin regulations and impact on trade

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- Codex standards are advisory
- National standards vary widely depending largely on the level of economic development and the susceptibility of a nation's crops to contamination (stringent based on the “precautionary” principle)
- Regulations have significant economic consequences (lost trade, enforcement costs) mainly to developing countries

# Framework in aflatoxin control

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- Aflatoxin contamination is a complex problem:
  - Hard to solve by a single actor/discipline
  - Requires multi-stakeholder actions
  - Need to focus on the cause rather than the symptoms
  - No single answer (bag of tricks)
- Integrated and coordinated actions needed



# Abatement of aflatoxin problem: Prevention

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- Resistant varieties
- Native beneficials (non-toxin producer strains)
- Improved agronomic practices
- Postharvest: drying to safe moisture levels (in starchy cereals <15% SMC), clean, dry storage

# Abatement of aflatoxin problem: Decontamination

- Removal: cleaning, physical sorting (e.g. sifting broken kernels), chemical binders
- Detoxification: Ammoniation





# Abatement of aflatoxin problem: Regulation

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- Setting of regulatory limits (legislation)
- Enforcement:
  - Monitoring to ensure compliance with limits
  - Taking appropriate enforcement action
- Providing guidance

# Summary of GAPs and GMPs for aflatoxin control (Codex, 2002)

Stage	Commodity	Hazard	Control measure
Preharvest	Cereal grains, oil seeds, nuts	Mold infestation with subsequent aflatoxin formation	<ul style="list-style-type: none"> <li>- Use resistant crop varieties</li> <li>- Use native beneficials</li> <li>- Insect control</li> <li>- Adequate irrigation</li> <li>- Proper agronomic practices</li> </ul>
Harvesting	Cereal grains, oil seeds, nuts	Increase in aflatoxin formation	<ul style="list-style-type: none"> <li>- Harvest at appropriate time</li> <li>- Rapidly dry to safe moisture level</li> </ul>
Postharvest storage	Cereal grains, oil seeds, nuts	Increase and/or occurrence of mycotoxin	<ul style="list-style-type: none"> <li>-Protect stored product from moisture, insects</li> </ul>
			<ul style="list-style-type: none"> <li>-Store product on dry, clean surface.</li> </ul>
Postharvest, processing and manufacturing	Cereal grains, oil seeds, nuts	Aflatoxin carryover or contamination	<ul style="list-style-type: none"> <li>-Test all ingredients added</li> <li>-monitor processing/manufacturing</li> <li>-Follow good manufacturing practices</li> </ul>
Animal feeding	Dairy, meat and poultry products	Transfer of mycotoxin to livestock products	<ul style="list-style-type: none"> <li>- Use good quality feed ingredients</li> <li>-Test products for aflatoxin</li> </ul>

# What is PACA?

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- PACA is an innovative consortium aiming at coordinating aflatoxin mitigation and management across health, agriculture and trade sectors in Africa.
- PACA aims to adapt proven solutions, and identify new ones, that will work for African situation.

# PACA Comprehensive Program

Food Security | Trade | Health

Policy, standards and regulations

Testing (sampling; diagnostics)

Pre-harvest including  
beneficial fungi

Post-harvest  
drying, storage,  
handling

Market  
development:  
structured  
demand,  
alternative uses

Consumption

Training, communication, and capacity strengthening

Economic  
Assessments

Food Security  
Assessments

Health  
Assessments

# Genesis of PACA

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- BMGF recognized need for aflatoxin control beginning in 2010 with WFP
- Opportunity to integrate action across Agriculture, Trade and Health
- Create Africa-based, Africa-led approach to aflatoxin control
- Bring to scale aflatoxin control technologies while building system of coordination



# PACA Timeline

Date and Location	Event
23 March 2011, Yaoundé, Cameroon	CAADP PP, asked AUC to explore establishment of PACA
3-4 October 2011, Nairobi, Kenya	PACA organizational planning meeting under the auspices of AUC
1-2 March 2012, Maputo	PACA Interim Steering Committee Meeting
25-27 June 2012, Ibadan, Nigeria	PACA Interim Steering Committee Meeting
30 October – 1 November 2012, Addis Ababa, Ethiopia	PACA Launch and Steering Committee Inauguration
10-12 April 2013, Dar Es Salam	PACA Strategy Development Stakeholders' Consultation Workshop
June 2013	Review of PACA Strategy document by Secretariat and strategy participants

# PACA Strategic Thematic Areas

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1. Research and technology for control of aflatoxins
2. Legislation, policies, and standards in the management of aflatoxins
3. Growing commerce and trade while protecting lives from aflatoxins
4. Enhancing capacity for effective aflatoxin prevention and control
5. Public awareness, advocacy and communication

# Conclusion

- Aflatoxin is an unavoidable as natural toxicant but options are available to manage it successfully
- Aflatoxin is a complex problem that can be addressed through integrated measures and coordinated actions
- The competitiveness of the African livestock industry is at stake unless the aflatoxin problem is addressed proactively

# Contact us

[www.aflatoxinpartnership.org](http://www.aflatoxinpartnership.org)

Email:

[amareayalew@yahoo.com](mailto:amareayalew@yahoo.com)

[wintas@africa-union.org](mailto:wintas@africa-union.org)

[chungaw@frica-union.org](mailto:chungaw@frica-union.org)



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Agriculture and Food Security

Partnership for Aflatoxin Control in Africa (PACA) collection

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26/06/2013

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Ayalew, Amare

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