

IPM-omics: Development of Scalable Solutions for Control of Pests of Cowpeas in West Africa

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Cowpea

- Important protein source for approximately tens of millions of West Africans that live on under \$2 a day
- Major crop in West Africa
- Insect pests are major drag on yield
 - Potential for doubling of yield
- We are working with IITA and NARS programs in Ghana, Burkina Faso, Niger and Benin

Cowpea

- **Six (6) major pests in the field – pest complex**
- ***Bt* cowpea may eventually help in control of one of these pests in countries where it is approved for release**
- **Pesticide sprays have serious limitations for control of the pest complex**

Integrated Pest Management-Omics

- Field studies of pest populations
- Plus “omics” tools to better understanding of those populations – molecular markers
- More cost effective pest management decisions – effective use of resources in large scale release programs
- Scalable educational ICT solutions



IPM-omics Equation

$$\begin{aligned} \text{IPM-omics} = & \textit{\underline{define the pest problems}} \\ & + \\ & \textit{\underline{appropriate solutions}} \\ & + \\ & \textit{\underline{scaling of solutions}} \end{aligned}$$

Integrated Pest Management-Omics

- Defining pest problems

More knowledge = better decisions that can be made for pest control;
Use of high throughput genomics tools to define pest populations

- Appropriate solutions

Bio-control/Bio-pesticide pipeline – discovery pipeline for solutions

Scaling of Solutions

- - Direct release into the environment and natural establishment
 - Highly scalable educational solutions
 - Private sector involvement (for “products in the marketplace”)



1 - Systems Understanding

- High resolution knowledge necessary to recommend and actively deploy solutions for cowpea farmers across West Africa

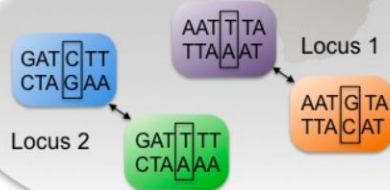


- In depth understanding of pest populations
 - Scouting – who (which species), where, and when
 - Molecular markers (SNPs and microsatellites) to define movement patterns of insects in time and space – necessary to understand the pest system

Mali, Burkina Faso,
Niger, Benin and Nigeria

AFRICA

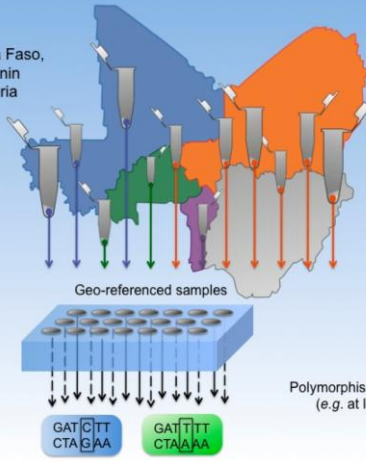
Samples are pooled and
cDNA library is made
and sequenced



Mali, Burkina Faso,
Niger, Benin
and Nigeria

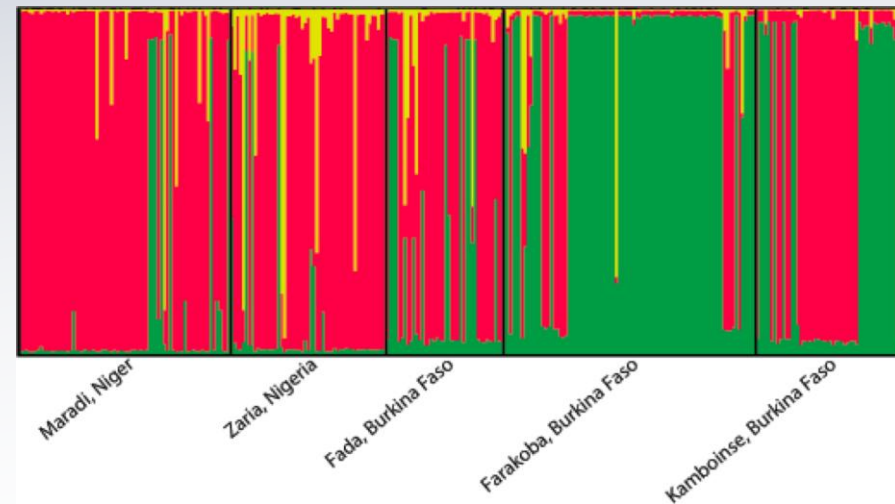
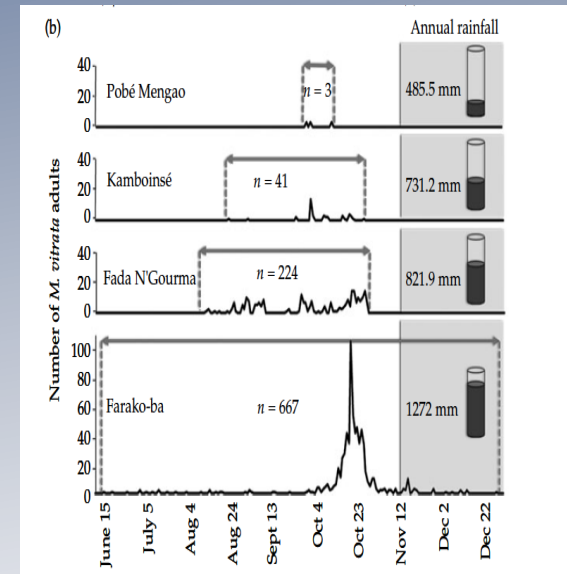
Geo-referenced samples

Polymorphism detection
(e.g. at locus 2)



Systems Understanding – What we have learned

- South to North migratory patterns
- Endemic zones
- Population structure on cowpeas and wild alternative hosts
- When and where to deploy biocontrol agents



2 – Bio-control/Bio-pesticide pipeline

- Bio-control & Bio-pesticide pipeline leverages >20 years cowpea IPM development at IITA Benin
 - Best best solutions are ready for fine-tuning and deployment



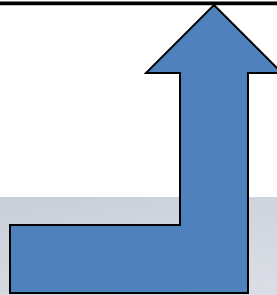
Control Measures					
Insect Pest	Biopesticides	Parasitoids	Virus	Genetic	Current Status
Flower thrips	Neem + essential oil from lemon grass, etc.	<i>Ceranisus femoratus</i>		Low-moderate Resistant varieties from IITA (TLII)	Pilot releases Benin, Ghana, Nigeria, established, working
Maruca pod borer	Neem + essential oil from lemon grass, etc.	Apanteles taragamae and Nemorilla maculosa, others to be tested from Asia	MaviMNPV		Rearing methods for Maruca and virus and parasitoids available
Pod bugs	Neem + essential oil from lemon grass, etc.	Egg parasitoids-which are these?			Simple and cheap rearing and release devices

Table 1: cowpea yield as affected by different pest control treatments in two different rainy seasons in Southern Benin*

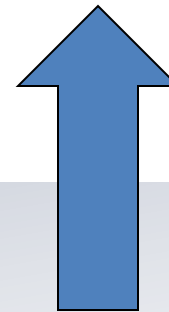
Treatment	1 st rainy season	2 nd rainy season
Unsprayed control	522,95 ± 28,20a	282,00 ± 21,88a
Chemical control (Decis)	868,62 ± 68,09b	652,75 ± 62,94b
Neem oil	826,42 ± 52,80b	691,22 ± 22,18b
Jatropha oil	867,90 ± 28,29b	533,60 ± 45,31b
<i>Mavi</i> MNPV	875,12 ± 47,83b	545,07 ± 54,50b
Neem oil+ <i>Mavi</i> MNPV	1082,10 ± 58,78c	552,47 ± 27,32b
Jatropha oil + <i>Mavi</i> MNPV	1096,30 ± 26,05c	614,33 ± 11,34b

*Kg/ha

High humidity
High *Maruca* density



Dry conditions after flowering
Lower *Maruca* density in pods



- 1) Doubling of yields under both conditions
- 2) As good as conventional pesticides

3 – Scalable Solutions

- Release of bio-control agents that become endemic and control populations
- Locally produced bio-pesticides
 - Neem + virus + essential oils
 - income generating activities – women and youth
- Educating cowpea farmers about solutions
 - Education networks
 - Scientific Animations Without Borders videos (appropriate techniques in local languages leave behind on cell phones to reinforce learning)
 - Creation of ICT solutions – identify pests with cell phones and obtain solutions instantly



Release of bio-control agents that become endemic and control populations

Creation of cost-effective and scalable releases for long-term pest suppression



Public-Private Partnerships



80 t of neem seeds collected by a community of 600 women (in Benin)



Neem oil extraction, 500 l / week

Bio-pesticides produced commercially



The final product: a commercially viable bio-pesticide

The next step:

same women groups mass-produce *Maruca vitrata*, infest larvae with the virus and sell the dead larvae to the enterprise for extraction, purification and conditioning

How can we share knowledge with
one billion low-literate learners in
their own languages?



Problems

- 1) Develop appropriate educational content for low-literate learners
- 2) How to share and deliver that content
 - Scalability
 - Economically efficient manner

Sustainable Development Virtual Knowledge Interface

- Approach for sharing appropriate materials for those that provide educational materials for low-literate learners
- Online “journal system” for such materials
- Peer reviewed content
- Contributors, reviewers, and editors from around the world – with a local focus



Peer-reviewed educational materials for sustainable development

www.susdeviki.illinois.edu

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Cholera Prevention A...	20	Reviewed	0
Cholera Prevention A...	20	Reviewed	0

Category : [1]

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Cholera Prevention Animation; Creole; accent from ...

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Cholera Prevention Animation; Creole; accent from ... SusDeViKi No: AGRI19A1 Back

Peer reviewed

Title : Cholera Prevention Animation; Creole; accent from Haiti; 3gp
Version : 1
Authors : Bello Bravo, J., F. Seufferhel...

Abstract : Cholera is an intestinal infection caused by bacteria known as *Vibrio cholerae*. The main symptoms of this disease are diarrhea and vomiting. Transmission of cholera primarily occurs by consumption of contaminated food or drinking water. In the video, which can be used on smart phones, we describe several techniques that can be used to help prevent cholera, including methods of treating water, washing of hands, and seeking medical advice if/when one has the symptoms of cholera. The voice over is in Creole, with an accent from Haiti, and the video itself is in the cell-phone ready 3gp format.

Language : English

Meta Tags : Haiti, Creole, contaminated food, diarrhea, vomiting, *Vibrio cholerae*, 3gp, SAWBO, Scientific Animations Without Borders, medical advice, hand washing, boiling, chlorine, water borne infections, contaminated water, bacteria, potable water, cholera, hygiene, sanitation, Disease

Categories : Agriculture and Life Sciences - 100%,
No of views : 5
Literacy level : 20
Last updated : 2/16/2011 4:56:58 AM

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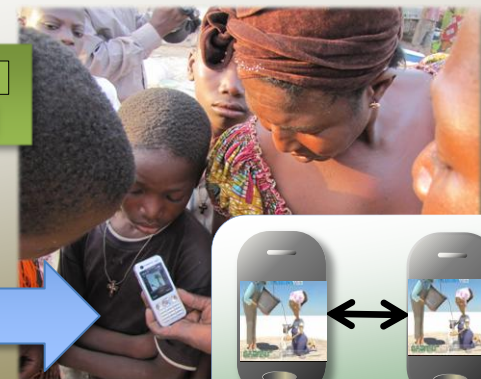
ColeraFL...	.3gp	7098887	0
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Language variants and new ideas

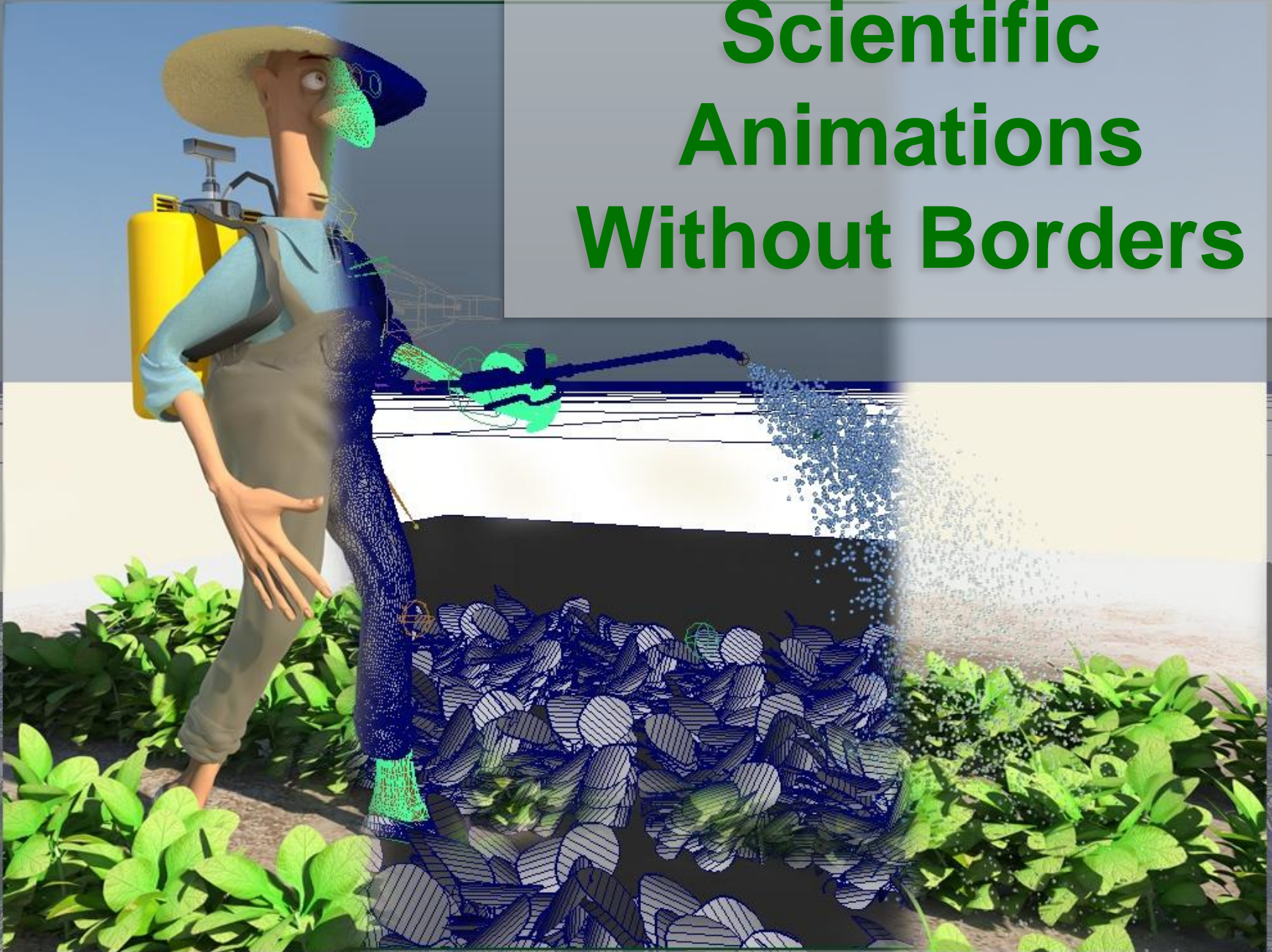
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Cholera



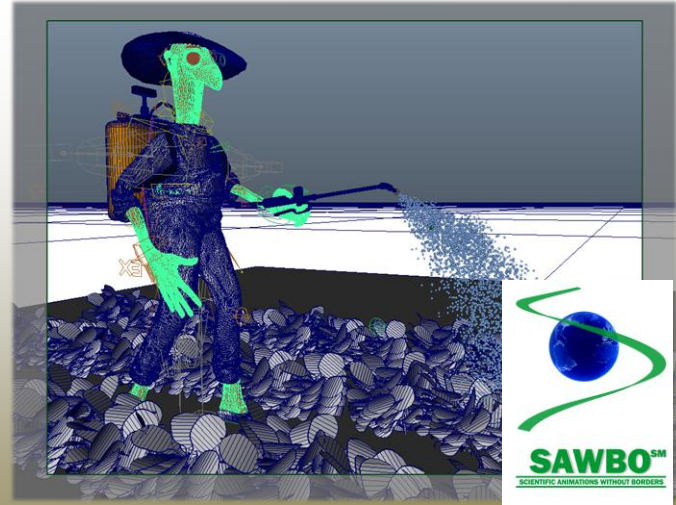
Scientific Animations Without Borders



(A)



(B)



(C)

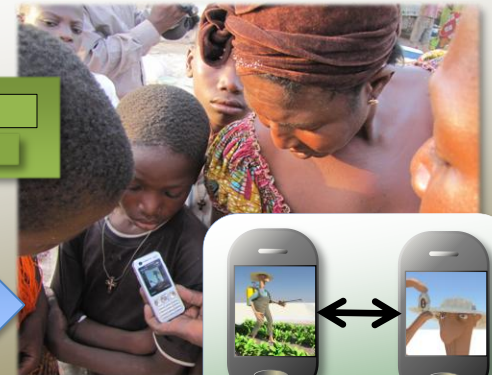


(D)

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Cowpea



Picture Courtesy of Dr. M. Tamo, IITA

IPM for cowpeas



Women Empowerment



Vector Borne Diseases



Other Health Issues



Agriculture and Postharvest Loss



Development and deployment



SusDeViKISM

Peer-reviewed educational materials for sustainable development

Sharing refereed educational materials on IPM for low literate learners in impoverished settings.



**SCIENTIFIC ANIMATIONS
WITHOUT BORDERSSM**

Use of animated videos in local language voice overlays to disseminate information on improved pest management practices for farmers and extension agents.

Farmer Organizations

Farmers

INFORMATION
SHARING WITH
TARGET GROUPS

Extension Agents

Non Governmental Organizations

Voiceovers

- International students, staff and faculty
- Virtual collaborators



Deployment

- Local groups
- Online
- Library systems
- Cell phones
- Video viewing clubs
- Etc...



Making materials available

- 1) Partner groups for creation and deployment of materials in other languages and regions of the world
- 2) All materials are given **FREE** to partner groups



From Scientific Animations Without Borders (SAWBO)   Reply  Forward  Archive  Junk  Delete

Subject Scientific Animations Without Borders presents Natural Insecticide from Neem Seeds in English with an accent from Nigeria 6/20/12 9:35 PM

To Barry Pittendrigh 

Other Actions



Today's featured video from Scientific Animations Without Borders™ is **Natural Insecticide from Neem Seeds in English** with an accent from Nigeria, which explains how to create an insecticide spray for controlling insect pests of cowpeas.



Other language variants will be featured in upcoming e-mails.

The Natural Insecticide from Neem Seeds animation can be found on the following

[SusDeViKi™](#) [SAWBO™](#)

[SusDeViKi™](#) [SAWBO™](#)
(light version) [mobile](#)

[YouTube®](#)

(Click on the site link to view or download the video.)

Scientific Animations Without Borders™ (SAWBO™), a University of Illinois-Champaign program, is pleased to announce free scientific animations for international



Sawbo project



Extension Systems in Your Wallet

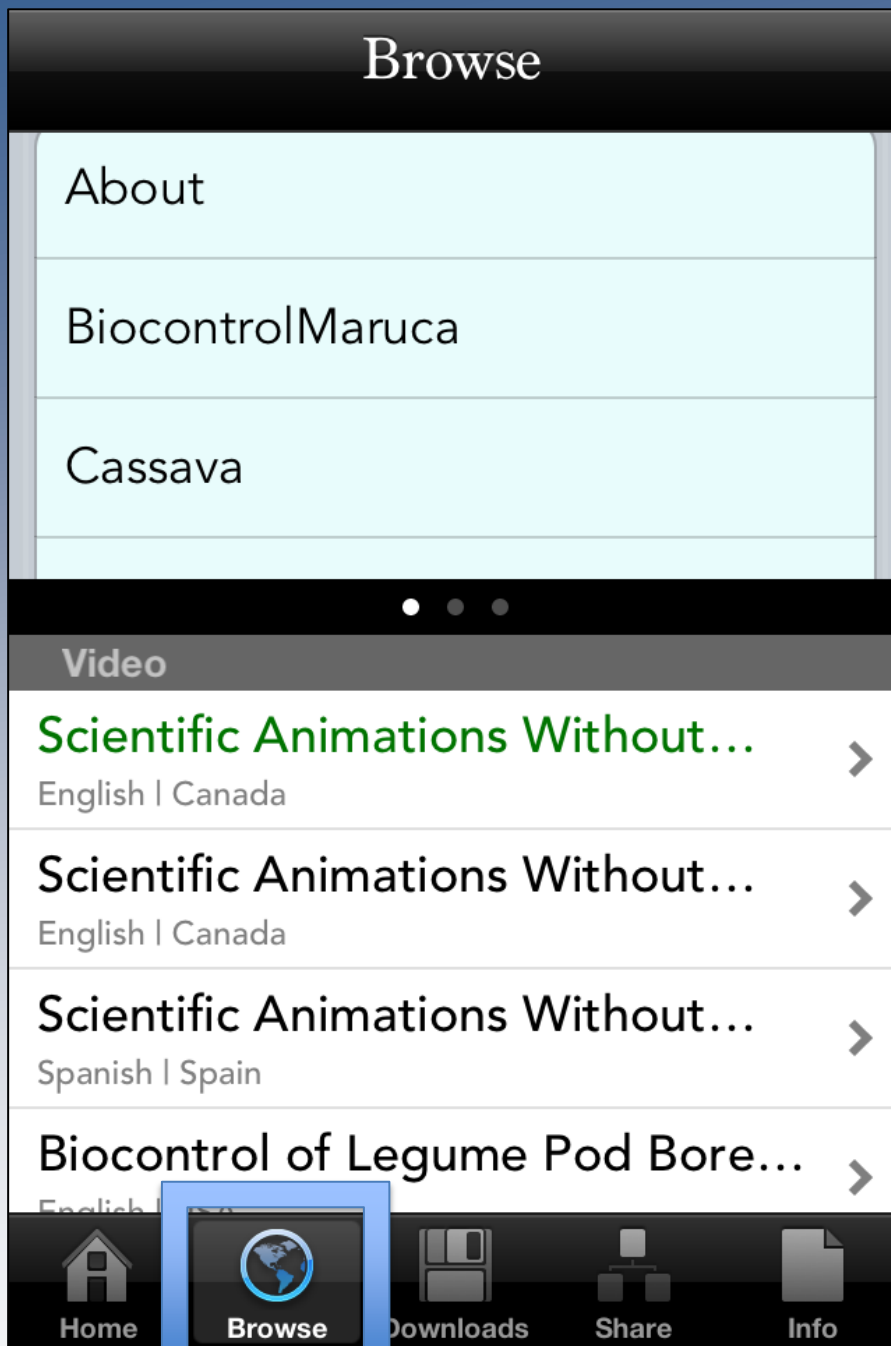
An Extension System
in Your Wallet.



SAWBO App

- A system to easily access educational videos
- Rapidly (in seconds) sort through hundreds or thousands of videos to find the one you want
 - By topic
 - By language
 - By country
- Videos can be downloaded onto the phone
- Share with other phones using Bluetooth®
- Alpha version has been created

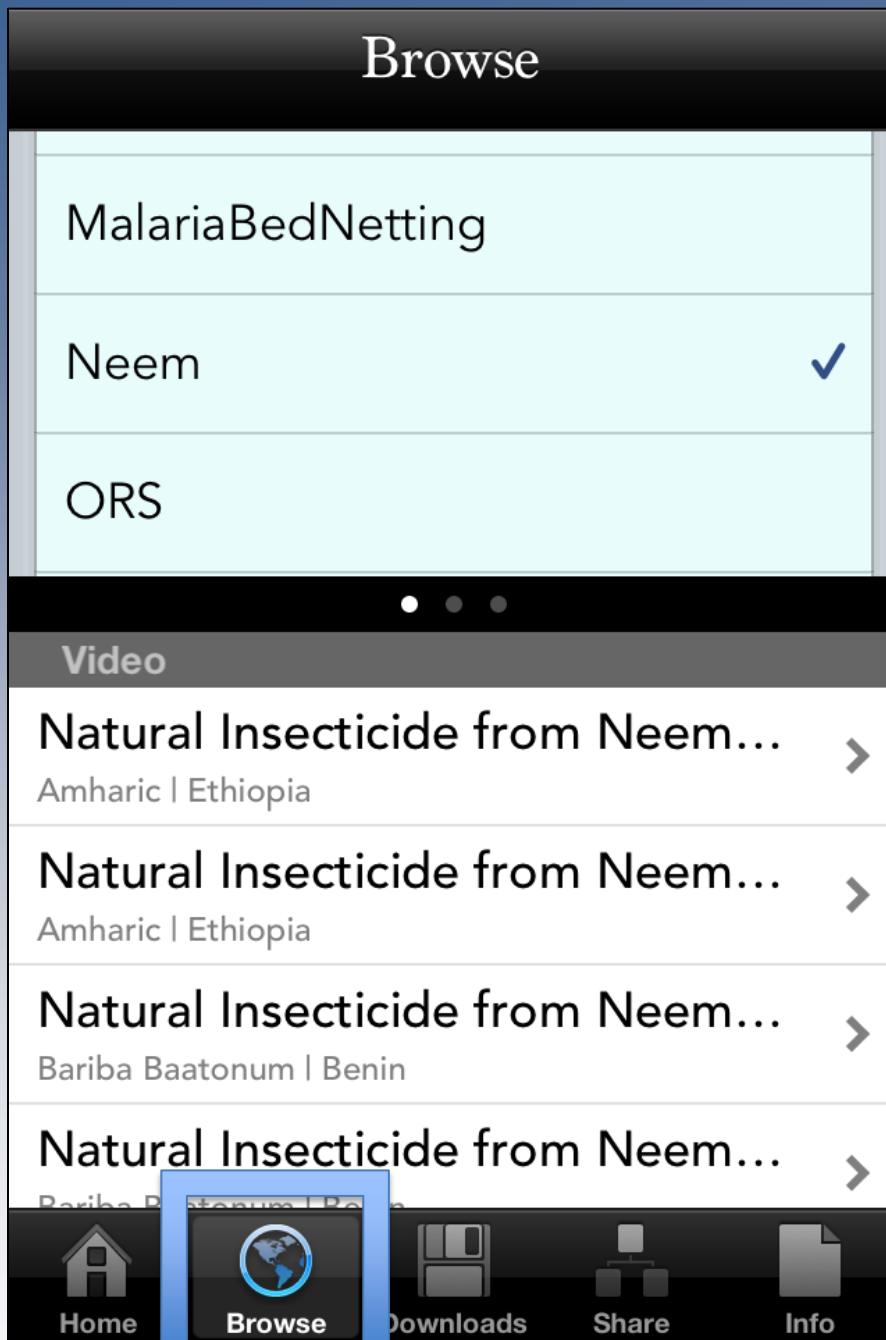




Scroll up and down to view 24 topics and many more can be added

Scroll up and down to view hundreds of videos (topics + language variants + different countries)

Thousands more can be added to the database



One topic is checked and the list below narrows

Now the list has narrowed to over 20 language variants of the video

Browse

Dendi

English ✓

Farsi

The language variant is chosen

Video

Natural Insecticide from Neem... >

English | Nigeria

Natural Insecticide from Neem... >

English | India

Natural Insecticide from Neem... >

English | USA

Natural Insecticide from Neem... >

English | USA

Now the list has narrowed to accent variants from different countries



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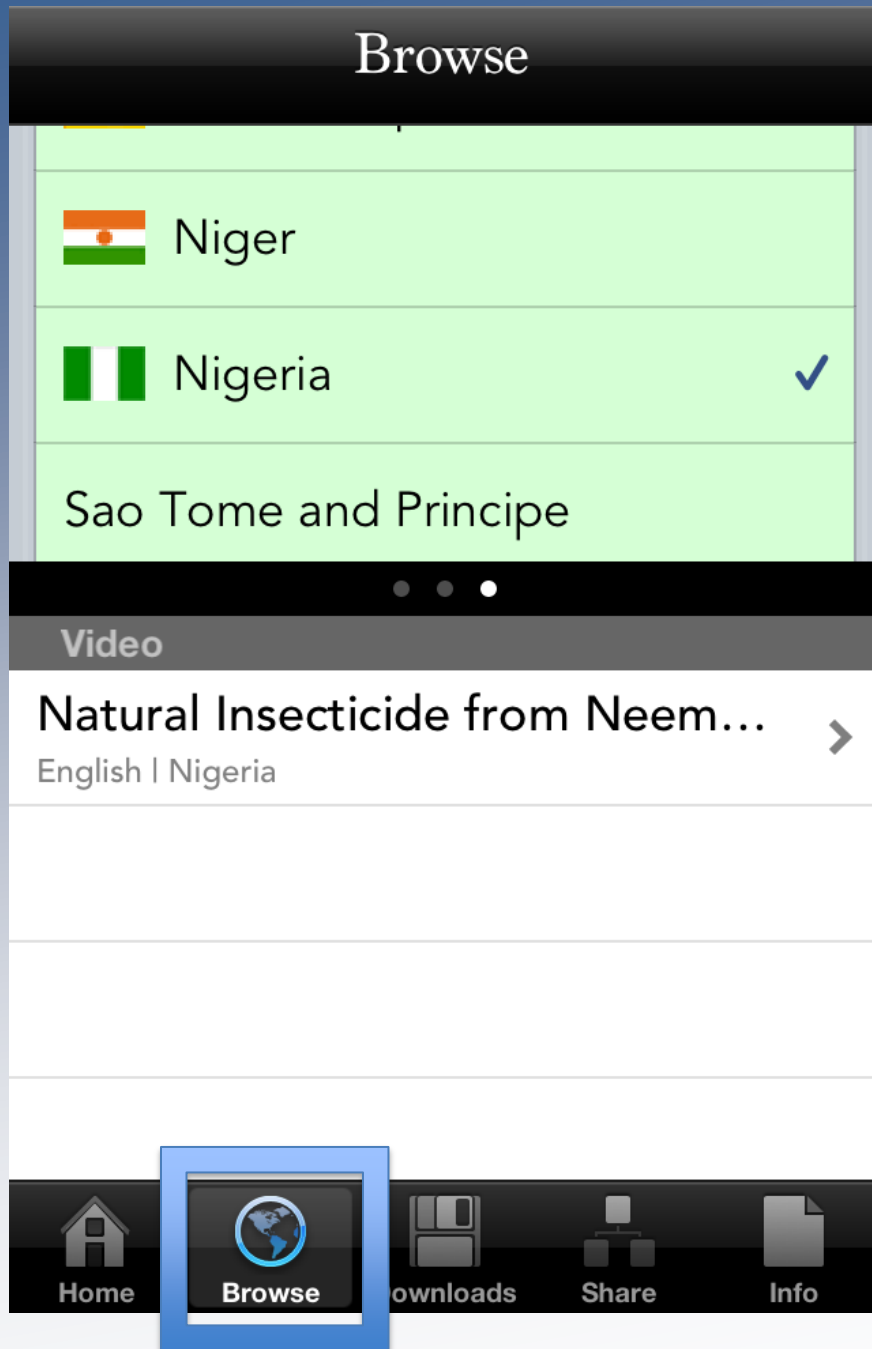
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Info



A county is chosen

A video on the topic,
the language and the
country accent is
now displayed



Cholera Prevention

Wolof | Senegal



How to Use a Metered Dos...

English | USA



Malaria Prevention: Bed...

Chichewa | Malawi



Natural Insecticide from...

English | Nigeria



Natural Insecticide from...

Hausa | Niger



Postharvest Loss: Bag Stac...

English | USA



Home



Browse



Downloads



Share



Info

Videos are now on the device and can be viewed offline and shared with other devices using bluetooth

Researchable Questions



What do people learn? What do they retain?



Who has access to the necessary technologies? How is this changing?



Cultural adaptations needed?



Do they use ideas directly or do they innovate?

Deployment pathways? Nodal analysis

Potential for use in educational and value chain pathways.



Scaling



YouTube (many in developing nations) – educators



Collaborating groups - voice overlays and deployment



Views and downloads on SAWBO and SusDeViKI systems

Direct impact on farmers through partner groups (plugging into their educational programs)



Developing nation librarians (given CDs for their libraries)

Video viewing clubs

Cell phone – Blue tooth transfer



Thinking towards the future for IPM- omics

Extension Agent / NGO / Farmer-Response ICT System

