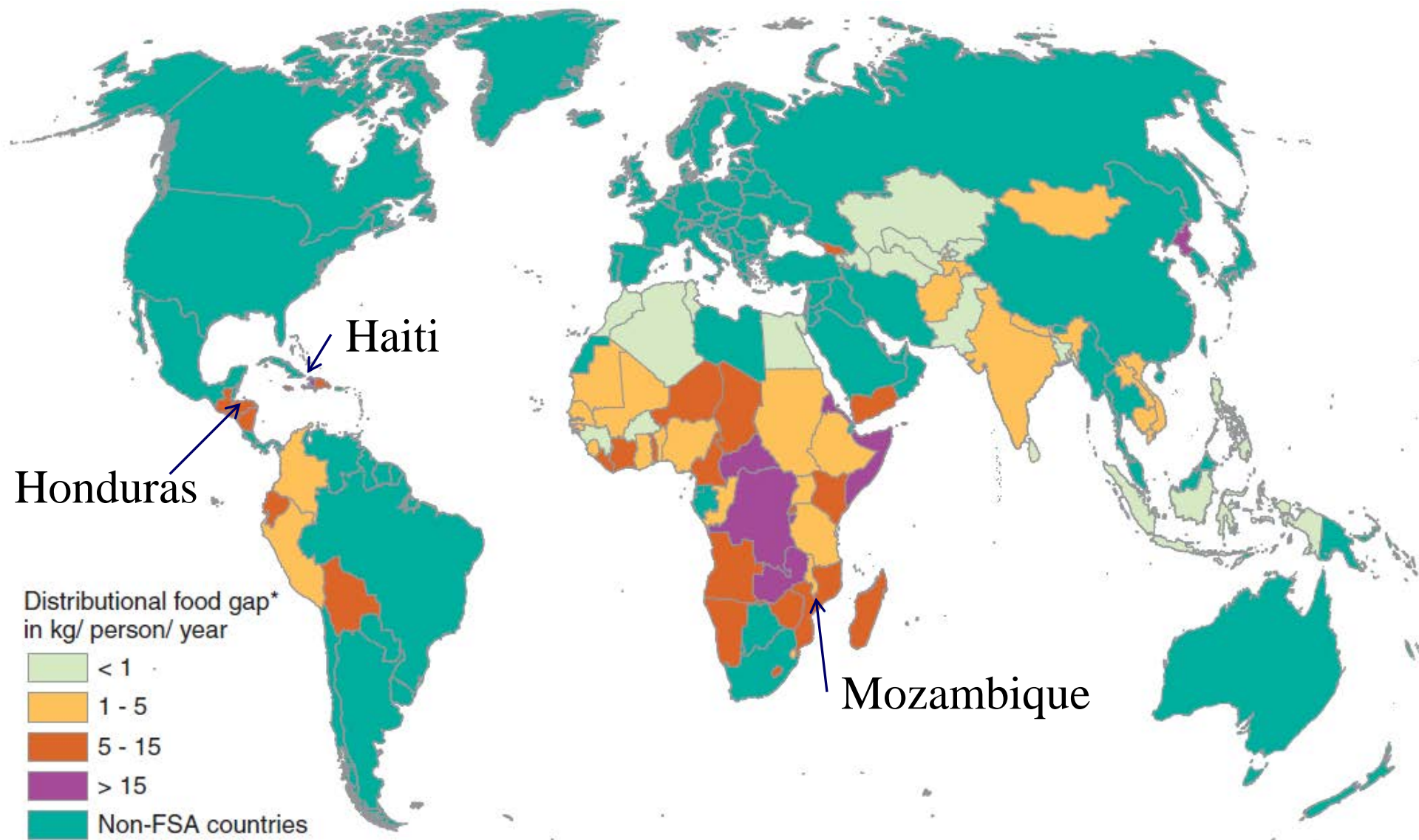




# Trilateral Cooperation: U.S. and Brazil Working Together on Horticulture in Haiti, Honduras, and Mozambique

Walter T. Bowen  
University of Florida  
The Institute of Food and Agricultural Sciences

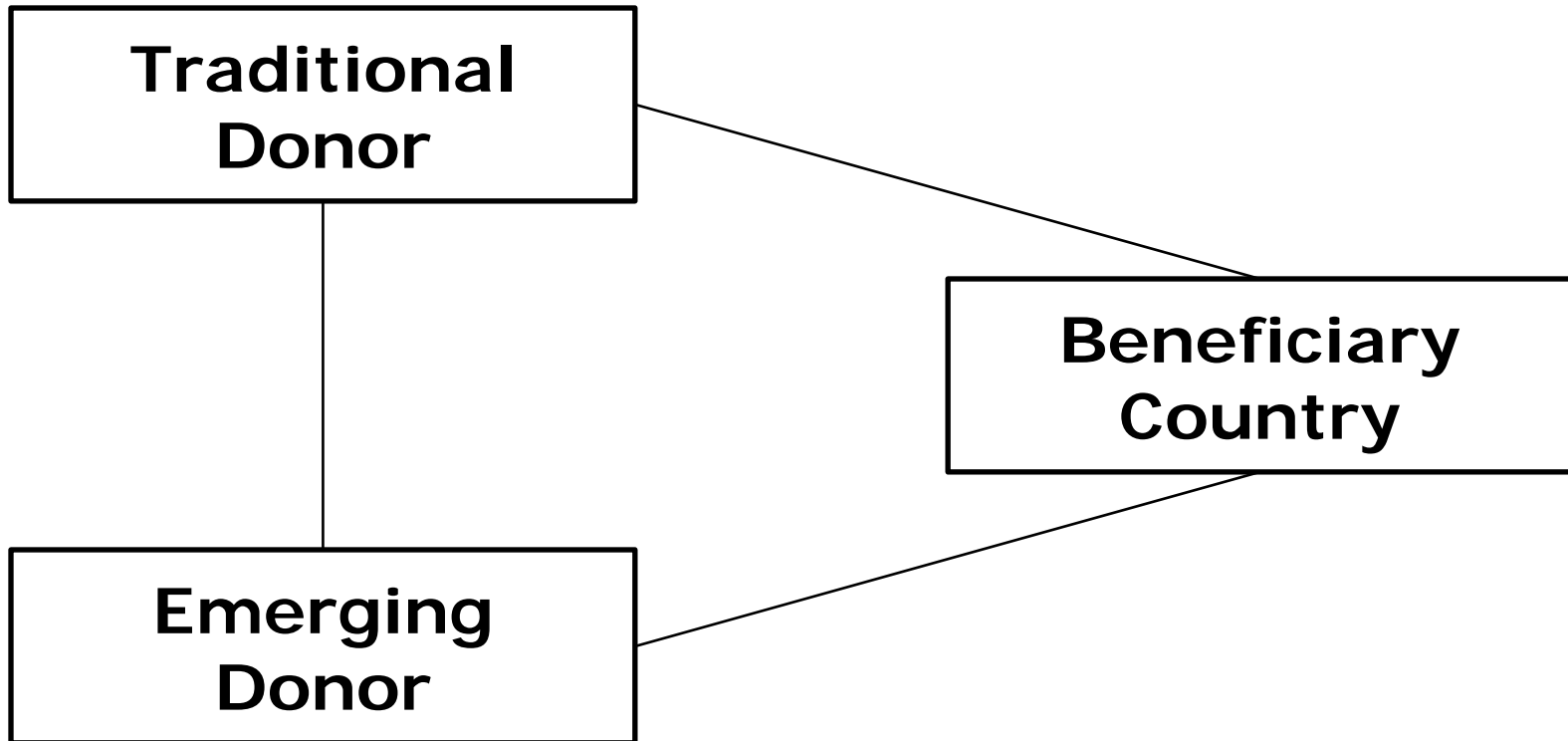


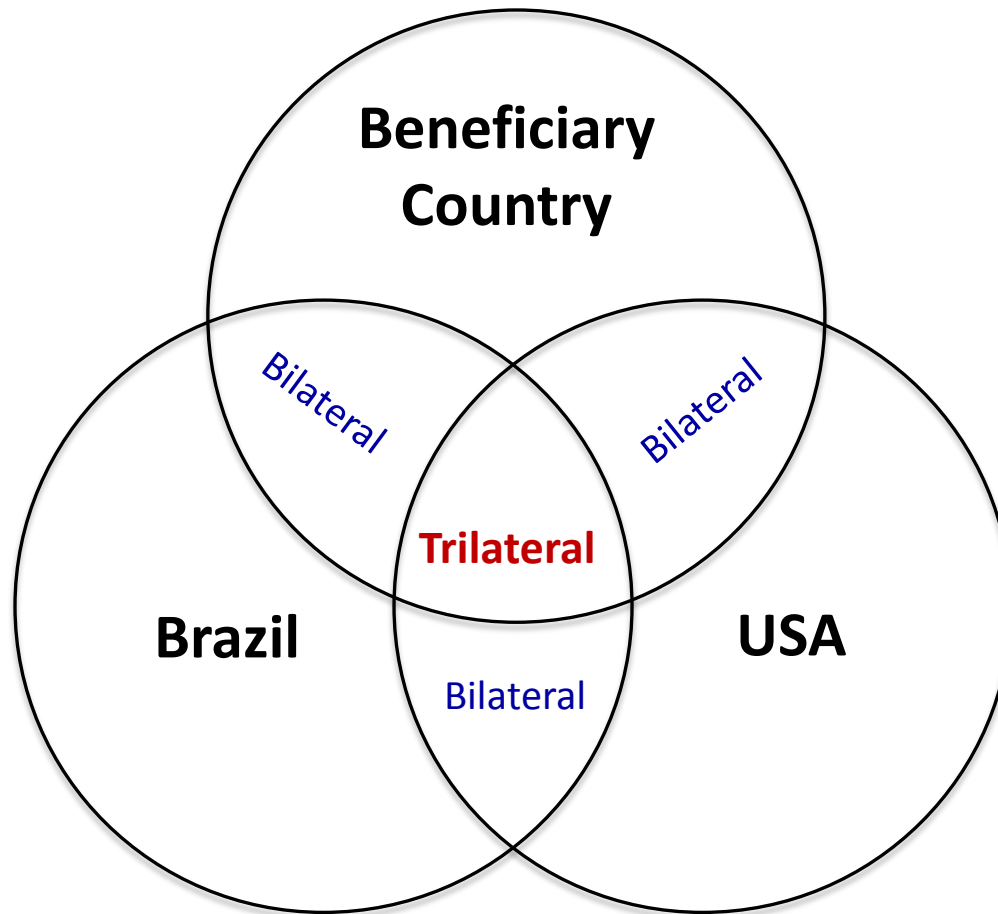


**Distributional food gap (kg/person/day) = food needed to raise Consumption to the nutritional target of 2100 cal/person/day**

# Trilateral Cooperation

*(Triangular Cooperation)*





**Trilateral Cooperation** represents a distinct three-way partnership for technical and development assistance that may complement bilateral cooperation

# TRILATERAL COOPERATION

## GOAL

To cut poverty and hunger by improving agricultural productivity, food security, and human nutrition through the joint efforts of U.S., Brazilian, and beneficiary country partners.

*As a strategic partner, Brazil brings expertise and resources that complement those of the U.S. and offer the possibility of more effective capacity building, technical assistance, policy engagement, and promotion of development.*

# Unidades da Embrapa Brasil



# Trilateral Program Components by Country

Country	Trilateral Program Component
Mozambique	<ol style="list-style-type: none"><li data-bbox="465 268 1754 429">1. Improve human and institutional capacity of the National Agricultural Research System (IIAM) to conduct research and extension on horticulture crops.</li><li data-bbox="465 454 1754 615">2. Improve human and institutional capacity of the Ministry of Education to implement school feeding linked to local agricultural production.</li></ol>
Honduras	<ol style="list-style-type: none"><li data-bbox="465 646 1754 808">3. Identify, assess, and facilitate investments in renewable energy (RE) applications that help poor rural households improve incomes and nutrition.</li><li data-bbox="465 832 1779 1051">4. Assist all partners to meet the FTF objectives of increased inclusive agricultural sector growth and improved nutritional status through 4 value chains: <i>high-value horticulture, cashew, sesame, and apiculture</i>.</li></ol>
Haiti	<ol style="list-style-type: none"><li data-bbox="465 1083 1731 1245">5. Increase the production and competitiveness of vegetatively propagated target crops (sweet potato and cassava) by developing improved seed systems.</li></ol>

# Trilateral Stakeholders

Donor	Donor Country Implementers	Beneficiary Country Partners
USAID/Brazil	University of Florida	National Agricultural Research Systems
	Michigan State University	Ministries of Agriculture
		Farmer Associations
Brazilian Agency for Cooperation (ABC)	Embrapa	Universities
	Renove	Private input dealers
		Renewable energy providers
		Community-based organizations

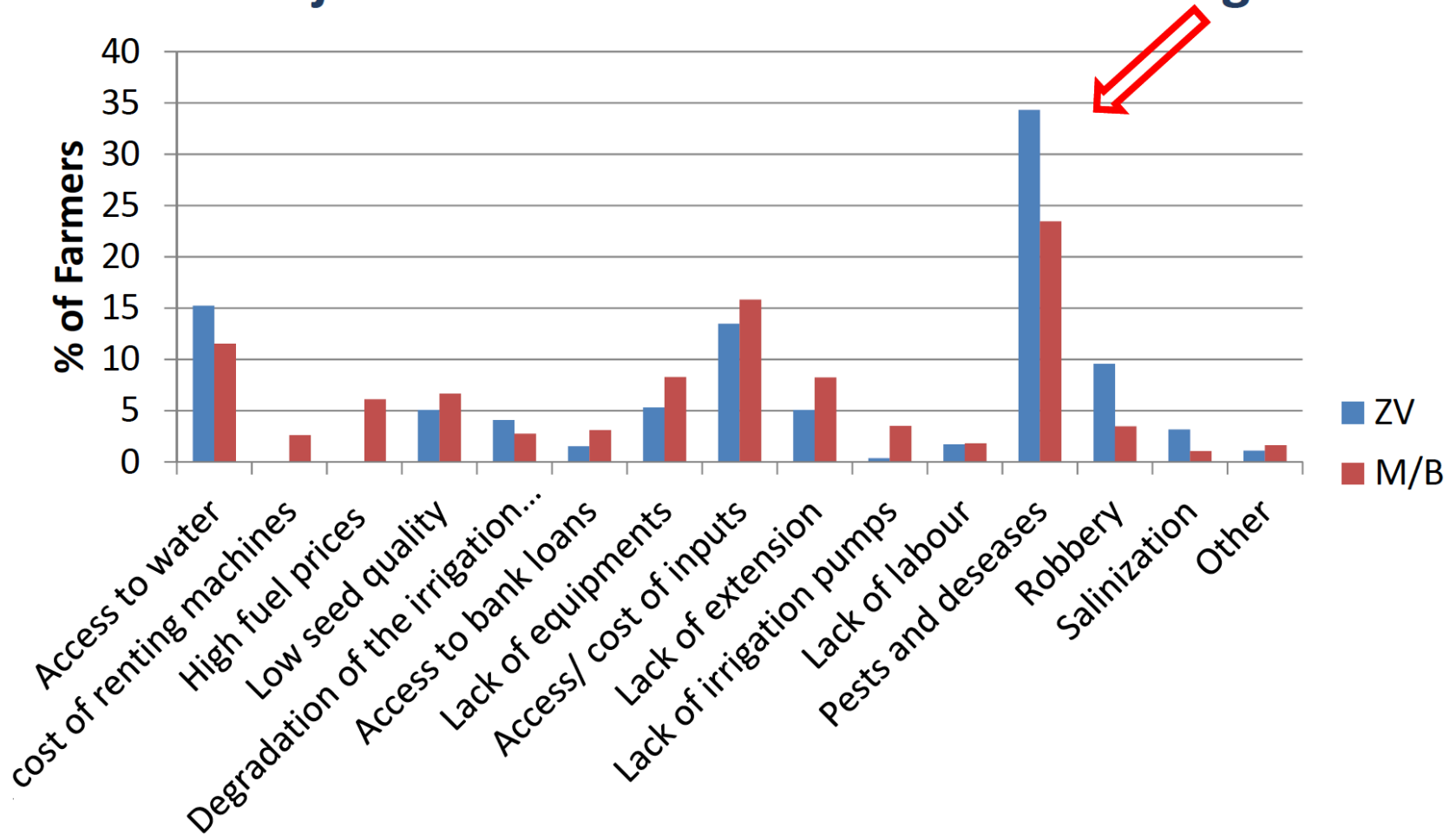


# Mozambique: Horticulture Component

- Socio-economics team  
Baseline, value chain, production costs, and pesticide usage studies
- Production systems team  
Testing new and improved varieties, improved crop management and irrigation technologies, and technology transfer
- Postharvest and agro-processing team  
Improving product quality through better postharvest handling, and the establishment of an agro-processing facility at the IIAM Experiment Station outside Maputo

Survey results for 616 households growing vegetables in the green belt (ZV) around Maputo or nearby Moamba or Boane (M/B)

## Major Problems in Horticultural Farming



# Building Capacity to Study Water Management

## Irrigation Systems



**Irrigation with buckets**



**Furrow**



**Conventional sprinkler**



**Microsprinklers**



**Microsprinkling Santeno®**



**Drip irrigation**

# Testing new and improved varieties

## Number of cultivars evaluated

Source	Carrot	Onion	Lettuce	Cabbage	Bell Pepper	Tomato Det.	Tomato Ind.	Garlic	Arugula	Arracacia
Brazil	8	10	15	8	7	6	8	6	3	3
USA	-	-	-	-	-	28	-	-	-	-
Local	5	4	2	10	2	12	-	2	-	-
Re-leased	3		3	2		1	1			
	<b>13</b>	<b>14</b>	<b>17</b>	<b>18</b>	<b>9</b>	<b>46</b>	<b>8</b>	<b>8</b>	<b>3</b>	<b>3</b>

**115 Cultivars evaluated and 10 released**






# Field testing

## Best performing varieties

Lettuce	Varieties			
Heat tolerance				
	Verônica	Veneranda	Laurel	Elisa

Garlic	Varieties	
Tropical varieties that are virus free – greater productivity		
	Amarante	BRS Hozan

Onion	Varieties		
Adapted for tropical environments			
	Bella Dura	Vale Ouro IPA-11	Franciscana IPA 10

# Field testing

## Best performing varieties

### Strawberry

### Varieties

Evaluation of improved transplants and varieties

Albion  
Festival



### Bell pepper

### Varieties

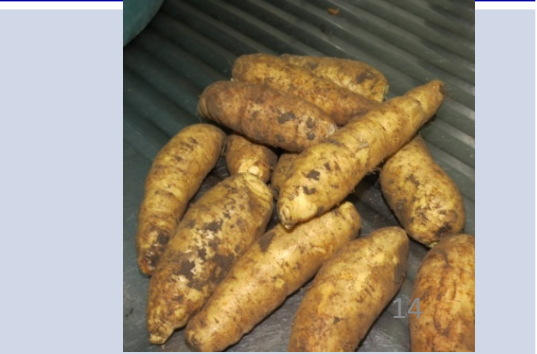
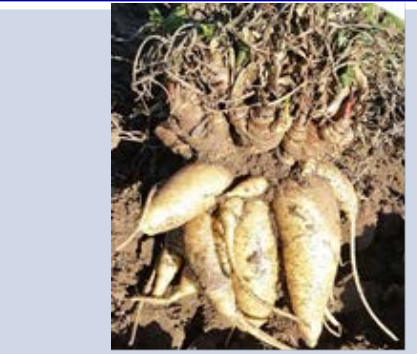
Variation in types (long or cone shaped)



### Arracacia

### Varieties

Introduction of a new root crop (Andes)

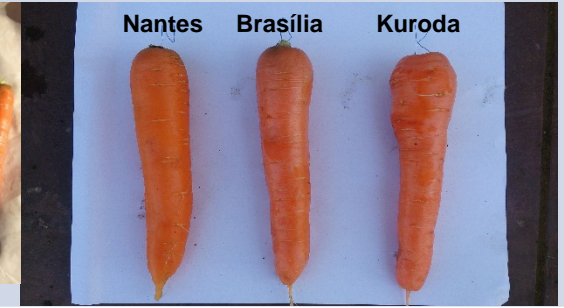
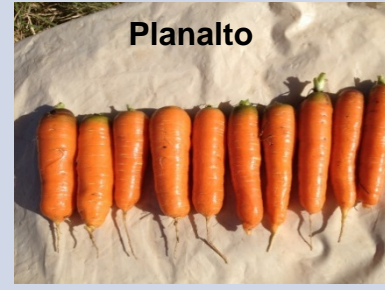


# Field testing

## Best performing varieties

### Carrot

Resistance to foliar diseases, and adapted to planting all seasons



### Varieties

### Cabbage

Head formation under hot conditions



Astrus Plus F1



Var. União

### Varieties

### Tomato

Reduction in losses at harvest

Climbing types



Tutoramento





Trilateral team members training Mozambican extensionists.



# Mozambican students assisting production systems team in starting seedlings for transplanting



## Substratos para produção de mudas hortícolas

Base I (2012)	Adoptado (2013)
Substrato organo-mineral + composto orgânico (proporção 1:1) + fórmula NPK 12:24:12 (600 g/100kg)	Substrato organo-mineral + húmus (proporção 1:1) + cinzas (2%) + areia (3%) + fórmula NPK 12:24:12 (600 g/100kg)





# Postharvest and agro-processing team in training at Embrapa



# Postharvest and agro-processing

Postharvest studies

Laboratory facilities improved at IIAM



Harvesting in the field

Portable shade system for field work



Agro-processing facility

Agro-processing facility developed at IIAM Umbeluzi Station



# Book of project results published November 2015



A integração de povos e a cooperação multi-institucional foram a razão e a essência deste projeto de cooperação trilateral entre Moçambique, Brasil e Estados Unidos. O suporte das agências de cooperação financiadoras e o trabalho da coordenação do projeto, das equipes de execução e principalmente o comprometimento e o apoio das diversas instituições locais foram concentrados no fortalecimento dos Programas de Nutrição e Segurança Alimentar de Moçambique (PSAL). Os resultados alcançados serão traduzidos em melhora dos índices sociais e econômicos da população moçambicana. Devem ser registradas entre as contribuições mais importantes do projeto a introdução de inovações tecnológicas nos modos de produção dos agricultores e, principalmente, a capacitação de lideranças, de investigadores, técnicos, professores e agricultores, homens e mulheres, para daqui para a frente, de modo agora autônomo, continuarem os avanços e as transformações que conquistaram.

Patrocínio



Parceria



ANEXOS  
1914-1915

Ministério da  
Agricultura, Pecuária  
e Abastecimento



CGPE 00000

Horticultura em Moçambique  
Características, Tecnologias de Produção e de Pós-Colheita

## Horticultura em Moçambique

### Características, Tecnologias de Produção e de Pós-Colheita



Cooperação Trilateral



# Cooperação Trilateral



Closeout  
work shop

# Best Practices for Trilateral Cooperation

- *Ownership and alignment:* Strategies to promote project ownership by participating individuals and organizations, especially those in the host country, and alignment with national priorities as well as other relevant ongoing programs;
- *Collaboration and coordination:* Strategies to promote leadership, communication among relevant partners, and harmonization of approaches;
- *Adaptive governance:* Flexible project management to adjust to changing conditions.

