



RESEARCH AND DEVELOPMENT

Annual General Meeting
Belmopan
April 2021

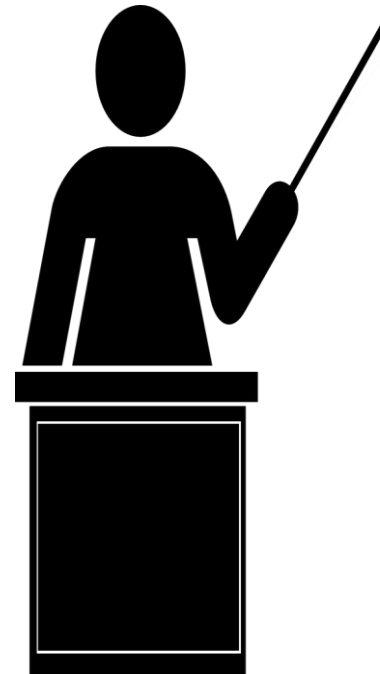
OUTLINE

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BACKGROUND

01

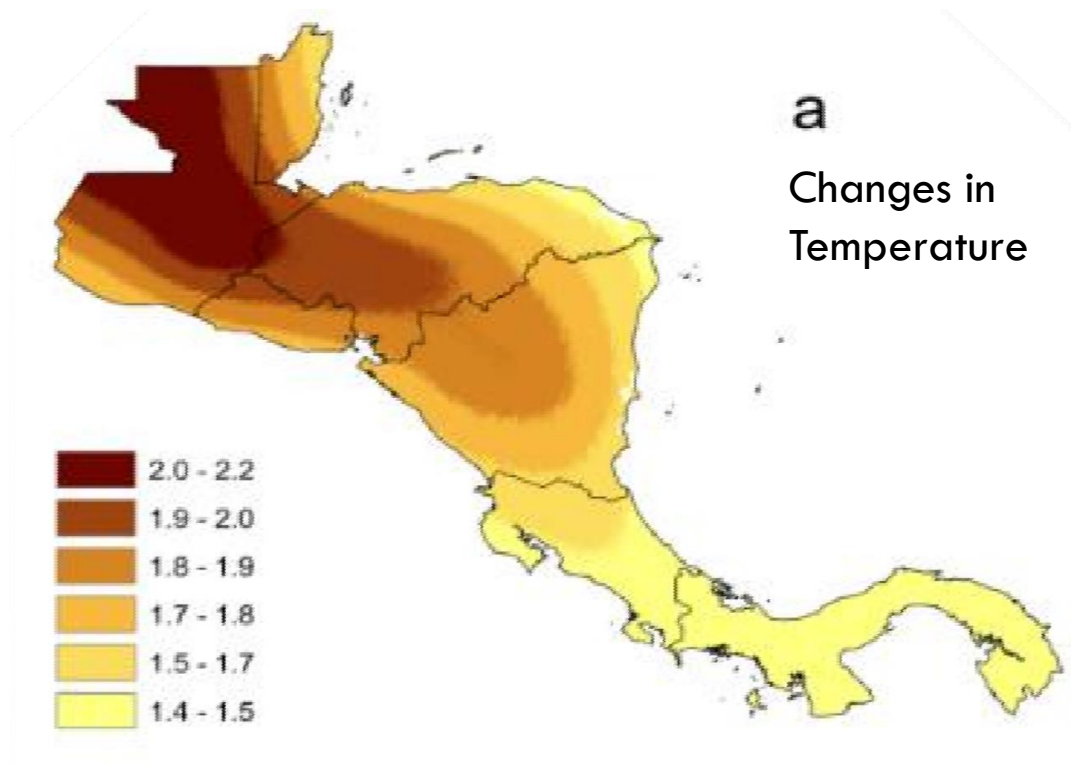
CHALLENGES OF THE PRODUCTIVE SECTOR

- Low productivity / Low technology
- High cost of inputs and labor
- Pest and disease pressure
- Reliance on rain-fed agriculture
- Limited market access (small volumes, high transport costs, fluctuating prices, low quality product)
- Poor state of agriculture facilities and infrastructure

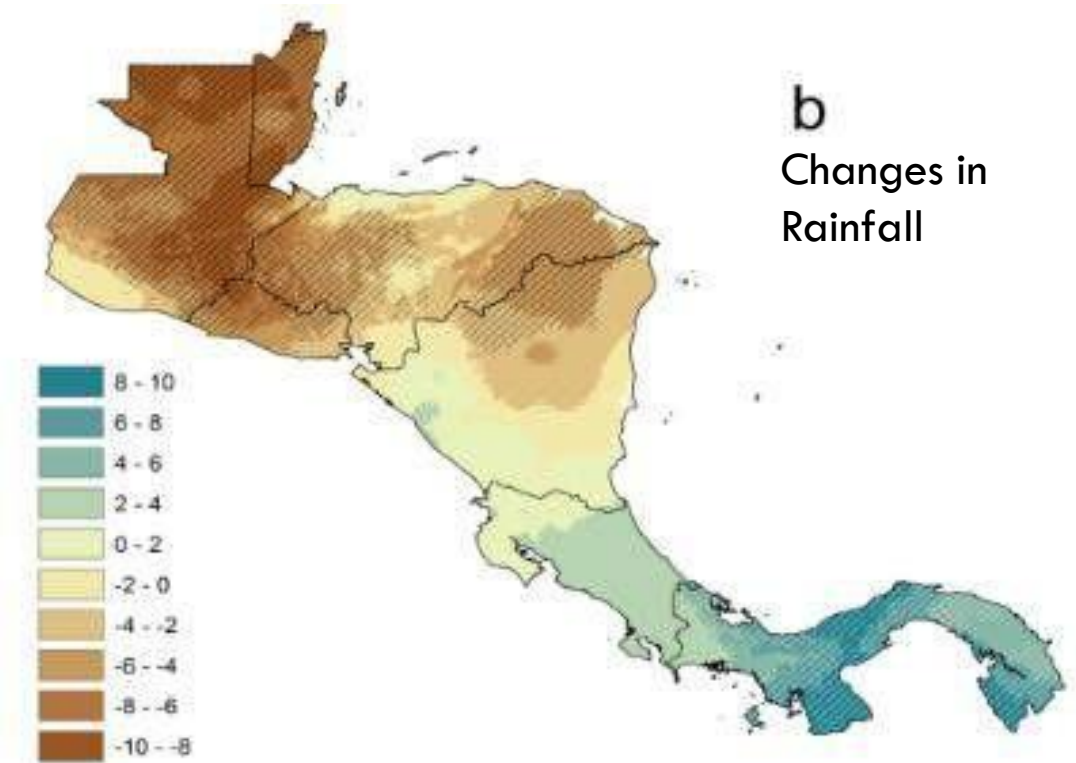
Climate Change & Agriculture: what to expect?

- **Decreasing rainfall** amounts and increased **variability of rainfall** will make it more difficult to plan for agricultural production.
- Major crops will see yield changes due to **increased temperatures**.
- **Livestock productivity decline** as a result of drought, poor pasture conditions and increased cost or unavailability of grain-based food.
- **Yields** of the major crops, namely sugarcane, rice, bananas, citrus, corn and beans, are all **expected to decrease**.
- Increase in **pests and diseases**, increases **water stress**, increases respiration rate which **stunts growth and development** and shortens growth periods.

In 2050...



The region will see higher temperatures, especially in northern countries



Rainfall patterns will change, northern countries will be dry while southern countries will experience greater rainfall.

Water shortage will be more intense. Higher temp will increase evapotranspiration, soils will be drier, arid region.

Documented potential impacts on small holders



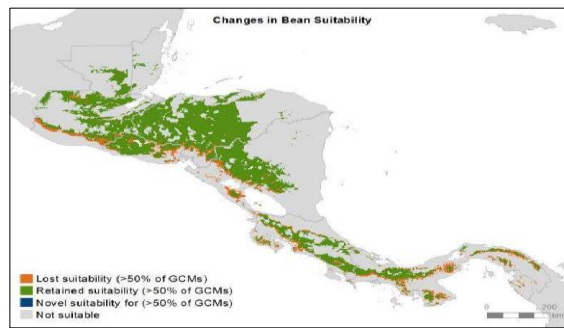
Lower yields (Hannah et al. 2017)



Changes in pest incidence (Avelino et al. 2015)



Changes in availability of natural pollinators (Imbach et al. 2017)



Changes in aptitude (Donatti et al. 2017)



Issues with water availability (Imbach et al. 2015)

CLIMATE CHANGE HAS FAR REACHING IMPACTS

Farm level

- Lower productivity
- Suitability for crop production
- Changes in pest incidence
- Reduction in water availability for production and home use
- Impacts on ecosystem services
- Structural damage
- Erosion, reduced soil health



Community level

- Reduced well-being of rural communities
- Reduced income
- Food security compromised
- Unemployment of farm workers
- Increase migration



National level

- Economic stability reduced
- Increased rural poverty and unemployment
- Deforestation as a result of expansion

WHAT WE EXPECT FROM THE AGRICULTURE SECTOR

1. Increase farmer's income
2. Food Security
3. Poverty alleviation
4. Create jobs
5. Increase GDP
6. Contribute towards foreign exchange earnings

ACCOMPLISHMENTS

02

Objective: Evaluate the adaptability of heat and drought tolerant crop varieties to Belize's agro-climatic conditions through the establishment of demonstration plots in 4 locations around the country.

Activities	Planned	Completed	% completed	Observations/results
Multiplication of introduced germplasm for use in adaptability trials.	1	1	100	Four Open Pollinated tomato varieties were planted in a tropical green house for seed collection. This activity also provided data collection on plant characteristics as the varieties are new to Belize.
Tomato seed extraction and saving process	1	1	100	The process of seed extraction and saving was established based on literature review and put in practice. Seed extraction yield 5-8 grams of seed per variety.

General Comments: The process of introducing and evaluating new varieties is time and resource dependent. Since varieties were for research purpose the multiplication phase is very important to ensure sufficient seeds for field evaluation. Viability of tomato seeds were dependent on temperature and fermentation period.

Objective: Assessment of the adaptability and yield of 37 new lines of biofortified red and black beans under climatic stress conditions of high temperature and irregular water availability.

Activities	Planned	Completed	% completed	Observations/results
Importation of biofortified bean lines	37 lines	37 lines	100	CIAT selected the lines with high iron content based on agro-climatic conditions in Belize
Establishment of Observation Yield Trial	1	1	100	Early flowering, lines differentiated in ability to tolerate viral and fungal diseases; all lines had high flower abortion and low pod set.

General Comments: The trial was established in May 2020 and conducted by CARDI at the Central Farm Station with funding and technical support from the MFAl in Belize, technical expert guidance from CIAT and coordination of HarvestPlus LAC and IICA. The OYT allowed researchers to observe genotype x environment interactions which gives an indication of adaptability to local growing conditions.

Objective: Enhance the research output of the University of Belize CF-Campus through mentorship and guidance in applied agriculture research.

Activities	Planned	Completed	% completed	Observations/results
Guide the planning, execution and reporting process of relevant agriculture research	22	21	95%	100 % was not possible due to COVID 19 restrictions on movement. 7 in crop production 8 in animal production 6 in other areas/case studies
Encourage partnership with the University of Belize CF-Campus for onsite trials	2	2	100	Two trials conducted at the RDIC in partnership with technical personnel.

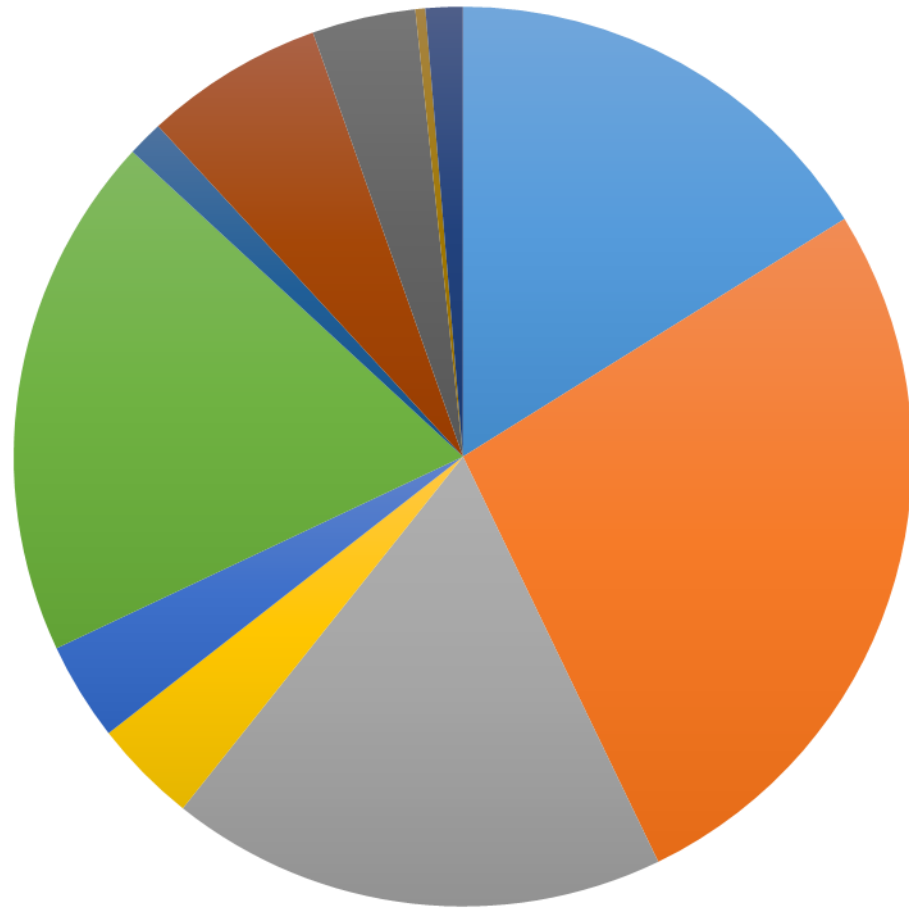
General Comments: Collaboration with the CF-Campus through the UB BSc. program in Climate Smart Agriculture presents a great opportunity for increased research output that is relevant, demanded and addresses main questions of the farming sector.

Objective: Produce and supply quality seeds to producers and build capacity through information and technology exchange

Activities	Planned	Completed	% completed	Observations/results
Harvest 15 ac of YC001 corn	15 ac	15 ac	100%	The 15 acres of corn “YC 0001 Variety” yielded 12,550 lbs. At the end of May 2020, a total of 7240 lbs. was available for sale and 1,250 lbs. was reserved for the next planting cycle in December 2020.
Harvest 10 acres of bean (Ceda and Negrito)	10 ac	10 ac	100	CEDA Variety red bean yielded 1425 lbs. and 5 acres of the “Negrito Variety” black bean 2300 lbs. An additional 500 lbs. of the three varieties were reserved for December 2020 planting.

General Comments: Farmers play an important role in the seed supply chain at the local level and the seed supply network of farmer seed producers should be re-established. This will ensure that seeds produced meet quality standards.

Tractor services



- Compound (16.4%)
- Crops (27.2%)
- Livestock (18.2%)
- Aquaculture (3.8%)
- ADP Plot (3.6%)
- Sheep Project (19.2%)
- Carpentry (1.3%)
- Farmers (6.6%)
- Horticulture (3.8%)
- Agroprocessing (0.4%)
- Other (1.4%)

Revenue Collection

Source	2017	2018	2019	2020
Livestock	43,460.75	60,141.25	52,204.50	65,137.50
Horticulture	2,204.50	8,745.75	5,689.00	8,164.35
Crops, Plants & Fruit Trees	8,389.50	14,983.25	8,729.75	9,677.50
Miscellaneous	41,544.07	61,275.05	48,280.00	30,856.50
Agro-processing	(1)	1,652.75	890.00	1,331.75
Tractor Services	2,883.00	4,786.50	6,370.00	11,701.75
Aquaculture	36,478.20	21,578.40	25,023.87	22,079.03
Rice & Corn	710.50	1,376.25	1,657.25	3,459.25
Sheep & Goat Project	(2)	12,494.00	15,459.00	15,306.00
Total	\$135,670.52	\$187,033.20	\$164,303.37	\$167,713.63

(1) Sales for 2017 agro-processing were recorded under Miscellaneous

(2) Sales from the Sheep project started until 2018

PROPOSED ACTIONS

03

Research, Development and Innovation Center

Vision:

To be the research and development center of excellence that is innovative, relevant and responsive to the emerging issues, challenges and opportunities in agriculture.

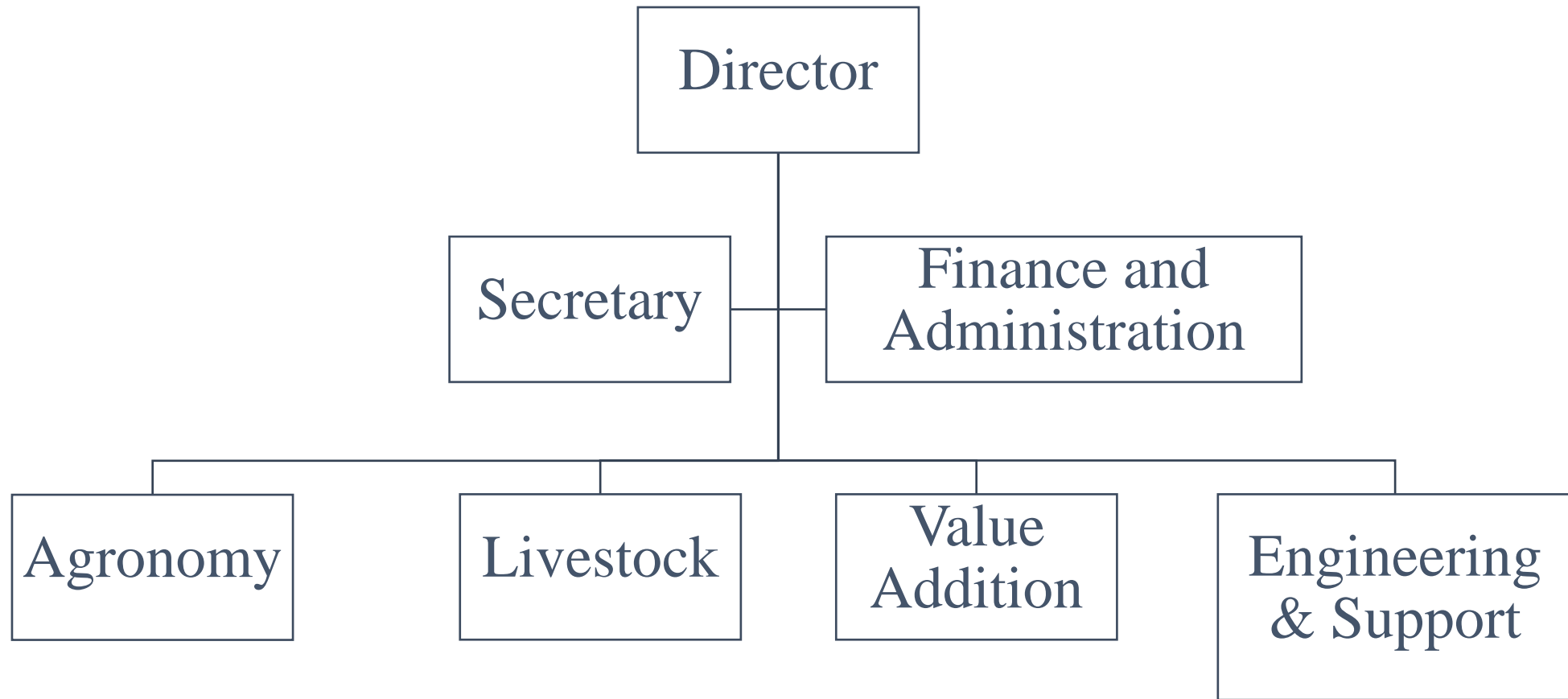
Mission:

To continue conducting relevant adaptive/on-farm research, validating technologies, promoting innovative techniques and methodologies, and providing developmental services that increases the competitiveness of producers while enhancing sustainable agriculture.

Values:

Integrity; Hard work; Professionalism; Teamwork; Dedication; Positive attitude, Equity

Research, Development and Innovation Center



1. Plant improvement, production, protection and sustainability includes fruit, vegetables, cereals and forage.

Research in this area will be aimed at:

- raising factor productivity,
- Improving post-harvest technology and management,
- disease and pest protection and improving the competitiveness of national agriculture products,
- traceability systems, quality and consumer preferences,
- diversification and integration,
- Soil ecology and biodiversity.

2. Livestock genetics, husbandry and health: Sub-themes include feed and forage, animal genetic resources, animal diseases, and husbandry

The research objectives in this area will be directed towards:

- Improving breeds (high production and disease resistant) based on production systems and market demand,
- Improving nutrition, animal health and disease protection,
- Evaluating livestock-based production systems (cost efficient, CC resiliency and mitigation)
- Feed and forage cost reduction and animal waste recycling.

3. *Natural resource access and sustainable use:* Access and use of land, water, energy, genetic resources.

Critical, long term researchable areas will include:

- sustainable management of natural resources (water and soil management)
- production systems that aim for climate change resiliency and mitigation (silvo-pastoral, IFS, IPM, regenerative systems).

4. *Policy, Institutions, and Organizations*: Interventions are needed to at this strategic level to explore and create opportunities that support agriculture and agricultural research and innovation.

- Agriculture research policy
- National research and extension system
- Networking and Capacity building

CONCLUSION

04



R&D IS FOCUSED ON

1. Supporting agricultural development by validating applied technologies
2. Remain focused on prioritized commodities and cross-cutting issues
3. Strengthen linkages between national research partners, extension services, academia and private sector
4. Remain steadfast that research must be quantifiable and relevant, with clear results and time and budgetary efficiency



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THANK YOU |