



For the Last 8 Years,

&



Have collaborated in the Caribbean with



IEC-H2K has also done several Rice trials at several places in Guyana and Sugarcane Trials at Worthy Park - both of which gave promising results

We are pleased to present this further body of work for consideration as new agriculture directives from International Groups such as WHO & FAO have been included in the following presentation



Introduction and Background

Guyana's Strategic Location,
Alliances and
Large Landbank

easily makes Guyana one of the **biggest players in food production and distribution** in the Caribbean and the Americas.

Its Agriculture Potential is Diverse and contributes to enhance:

- **Food Security,**
- **Employment, and**
- **Economic Growth.**

Sustainable practices can ensure long-term benefits of the same.

Importance of Sustainable Agriculture

Sustainable agriculture ensures

- **Long-term food security,**
- **Minimizes environmental impact, and**
- **Supports local economies.**

To be Sustainable, would be to create multiprong parallel and interlocked systems that can complete and sustain each other and make the countries and its allies more independent.

In Guyana, growing vegetables and fruits sustainably is key.





The current state of Agriculture in Guyana

Agriculture is one of Guyana's most important sector.

The country's main crops are rice, sugarcane, and several other grains, vegetables and greens.

There is room for improvement in terms of Productivity, Adoption of higher value crops, Supporting Infrastructure, Markets and Sustainability



Importance of Food Security

Food security ensures access to safe, nutritious, and sufficient food for all. Sustainable agriculture practices promote food security and healthy ecosystems.



Challenges faced by farmers in Guyana

- Soil Optimization - Decreasing Soil quality, contamination, and performance
- Safe Produce - Pests and diseases affecting crops.
- Innovation and Technology - Need for Innovation of alternate technologies and practices.
- Support Industry - Underdeveloped agro-processing and storage industry and poor transportation infrastructure for moving produce to markets.
- Markets and Trade - Innovation in Market structure / Trade channels to benefit farmers
- Small and Micro-Business Ecosystem - More Agro-entrepreneurship and small businesses, Limited access to financing and credit.

Introduction to



Founded in 2006,

Through In-House R & D in
Bio-Sciences and
Engineering

IEC Developed
Proprietary technologies,
IPRs and
Products,
And designed solutions in
different sectors and developed
businesses in the sectors like



WASTE
MANAGEMENT



ENVIRONMENTAL
REMEDICATION



AGRICULTURE



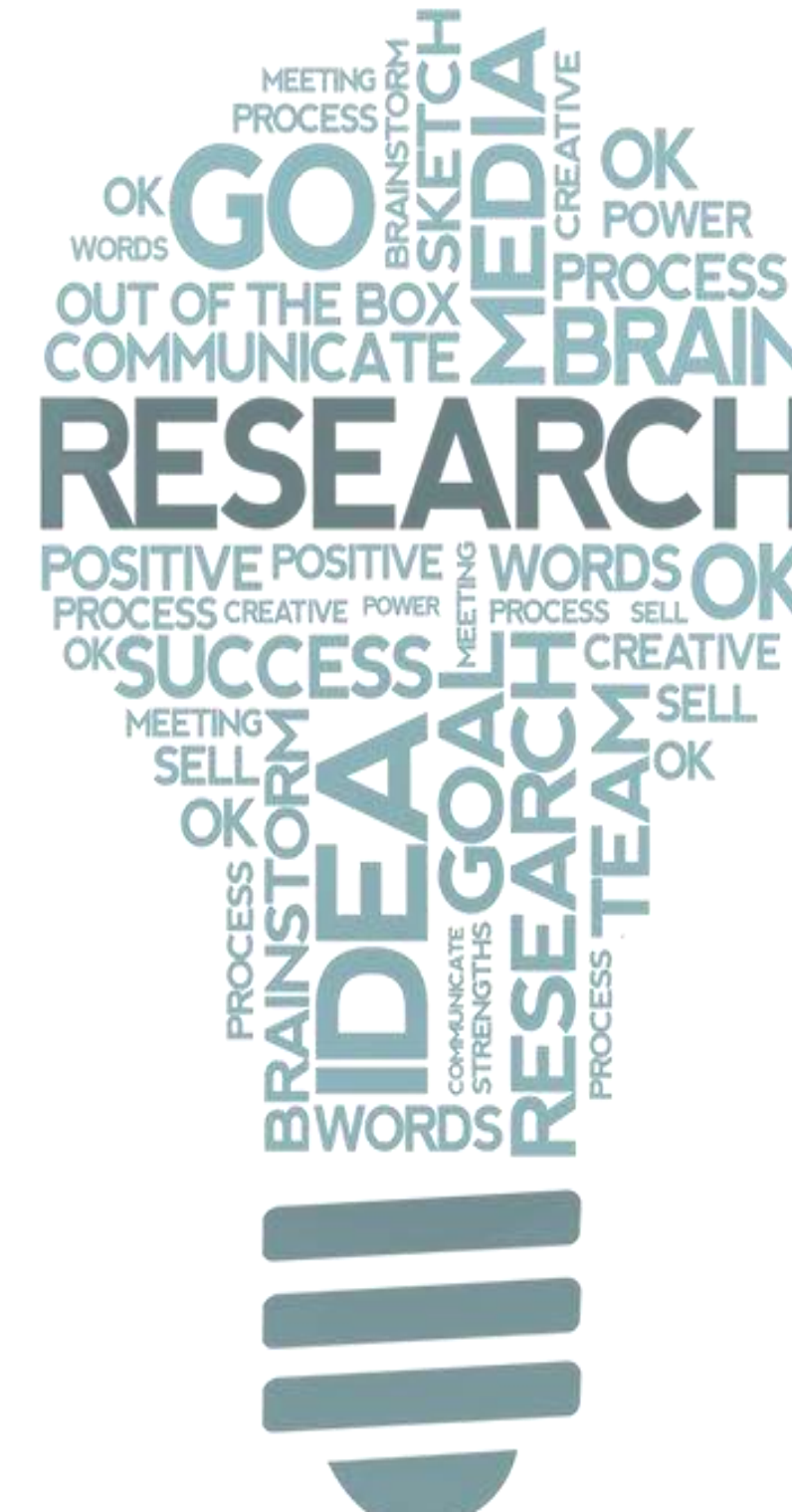
LIVESTOCK
& POULTRY



WATER
TREATMENT



GREEN
ENERGY AND
GREEN
MOLECULES



Introduction to H2K Agro.

Technologies and Strategies that are: **Socio-economically Important**

Unique Products

Rapid Scalability

Easily Adaptable Technology



Agriculture



Environmentally Challenged Farming and its Practices



Animal Husbandry & Poultry



Protected Farming - Hydroponics, Aeroponics

IEC-H2K's Forte in Agriculture



• **Farming with Saline water** (easily up to 10,000 TDS - with IEC's Salinity Utilization Technology),



• **Increasing Nutrient Availability** (Soil and water pH management and upgrading the Nutrition delivery system)



• **Decreasing Nitrogen Fertilizers** (Up to 50 %)



• **Reducing the incidence of Pest Attacks** (with nutrition, Plant extracts and growth milestone management),



• **Pesticide Free Pest management** (Up to 95% reduction in pesticide use*),



• **Soil Borne Disease Management**, Nematode Control (with Plant extracts and soil pH management),



• **Boosting LOCAL Microorganisms of soil**,



• **Reviving Organic Carbon in soil** (through microbial activity and degradation weeds),



• **Inviting Honeybees to Farms** (through IEC's SC Spray) - Honeybee presence is evidence for several toxic chemicals being absent from farm



• **Abiotic Stress Management** (improving growth milestones and nutrition management),

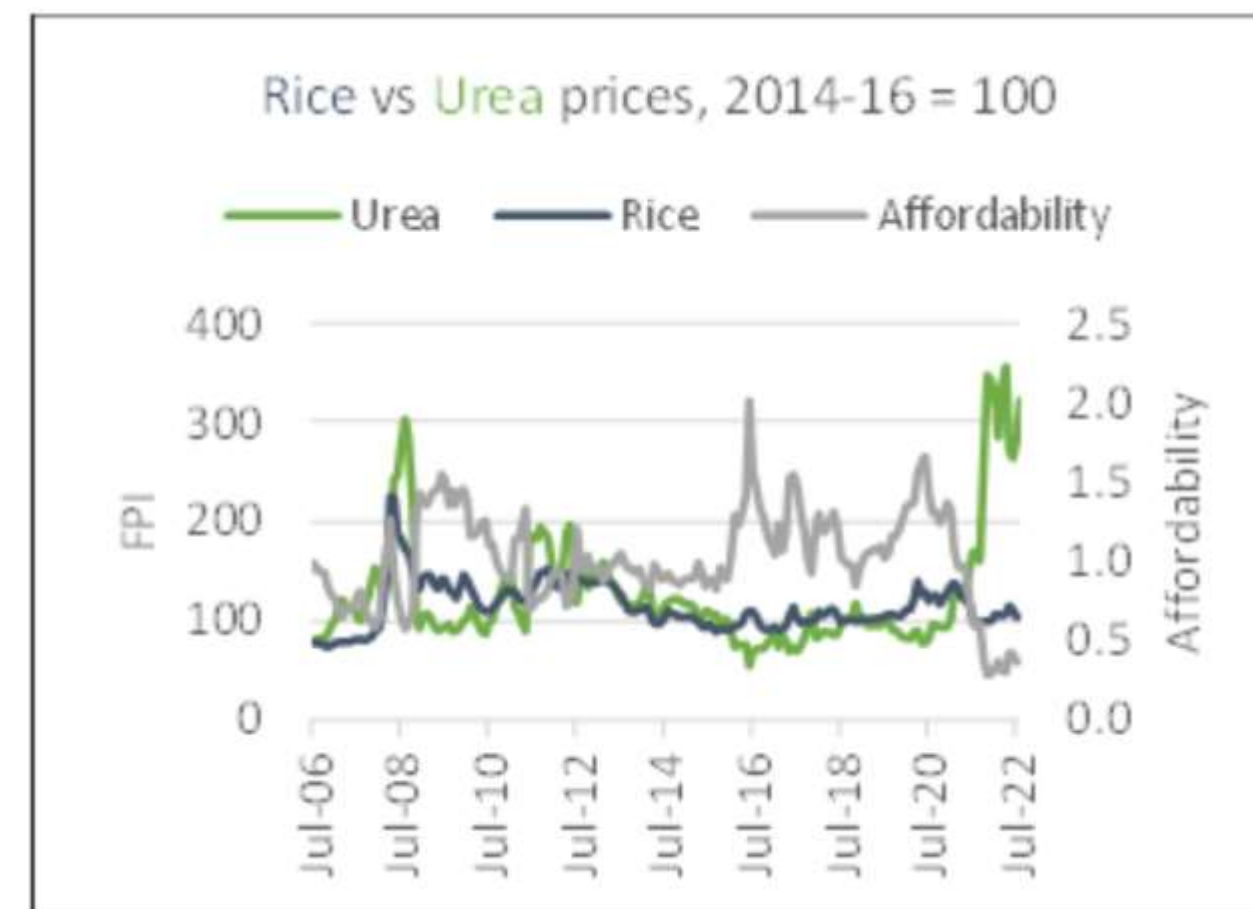
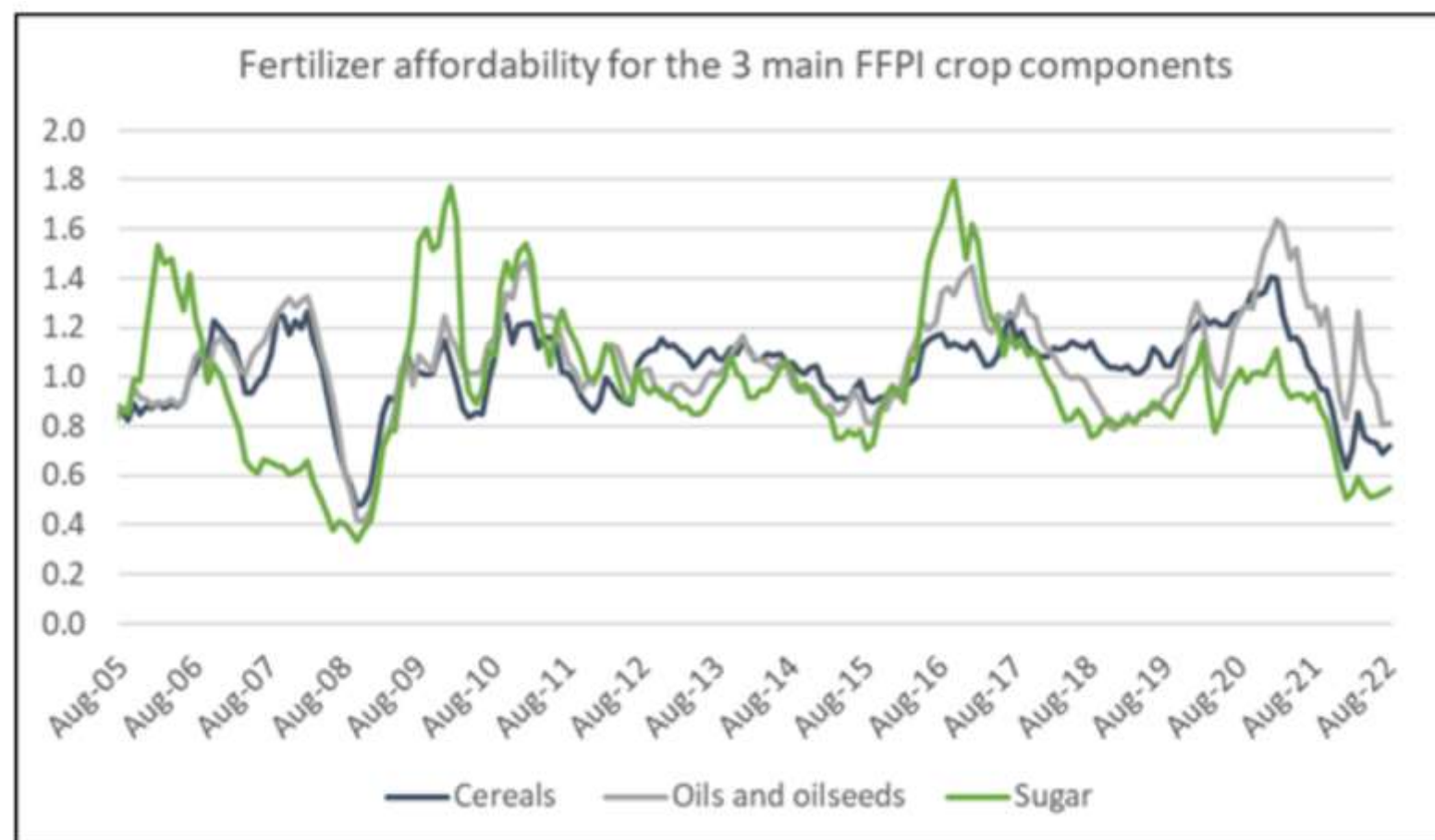


• **Increasing Biologically Active Substances**, i.e., Gingerol, Curcumin, Geraniol, CBD, THC (improving growth milestones and nutrition management)

**The term pesticide is used to collectively refer to bactericides, fungicide, sporicide, insecticides and other synthetic chemical formulations used to deter pests and diseases in agriculture.*

An Example of impact of fertilizer on commodity affordability

- Decrease in Urea (Nitrogen fertilizer) consumption can decrease such relative impacts



According to the FAO Food Price Index (FFPI)

International food commodity prices rose from 113.5 to 134.1 index points between January and December 2021, and then in 2022, to 159.3, its highest level since the inception of the index in 1990.

In 2021, the rapid rise in fertilizer prices lowered Commodity affordability, while affordability of fertilizers for cereals and sugar production declined to levels seen in 2020, it remained higher for oils and oilseeds.



Our Approach to Sustainable farming - Brief

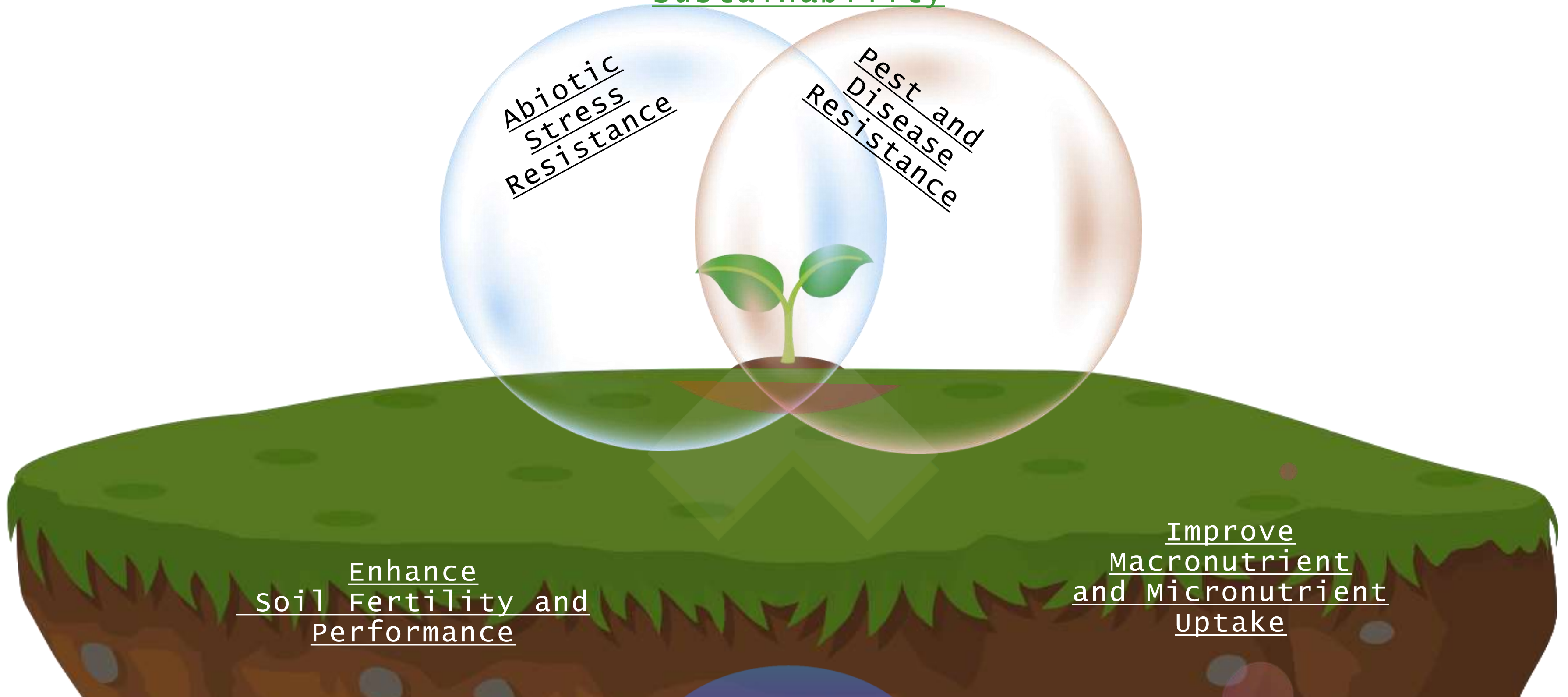
High Yields
and
Sustainability

Abiotic
Stress
Resistance

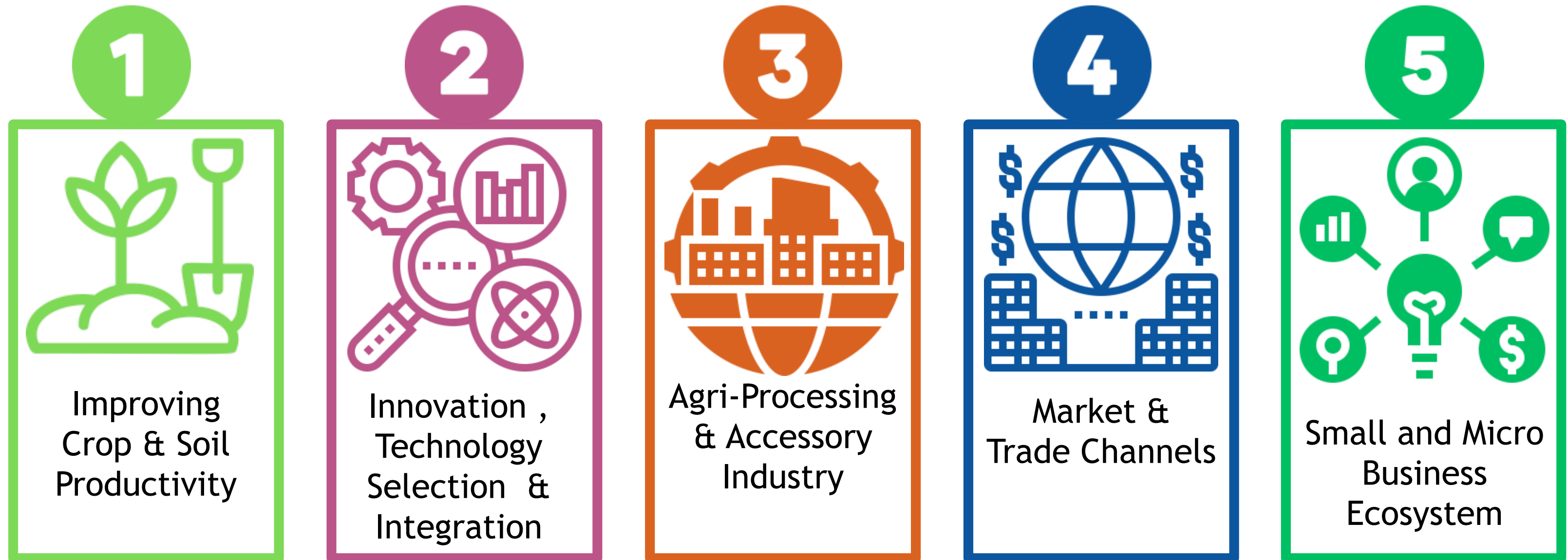
Pest and
Disease
Resistance

Enhance
soil Fertility and
Performance

Improve
Macronutrient
and Micronutrient
Uptake



How can Agriculture become more Sustainable in Guyana?



Addressing Farm Sector challenges in Guyana

Soil Optimisation - Improving Soil quality, contamination, and performance



- By brewing and reintroducing Local Microbes in the soil to make soil more active and responsive
- By affordable soil and water pH and biochemical management and decreasing fertilizer use (up to 50%) and improve plant performance (15-50%).
- By executing IEC Soil Treatment to improve soil organic carbon and soil pH.
- By utilizing IEC Salinity Treatment to mitigate saline water and soils

Addressing Farm Sector challenges in Guyana

Safe Produce - Pests and diseases affecting crops.



- By brewing and reintroducing Local Microbes in the soil to keep beneficial microbes active
- By using nutritive formulations to build insect resistance and minimize the products insects eat in the plants therefore decreasing insect attacks and insects' appeal to eat plants.
- By using affordable plant extracts to keep insect away and minimize plant damage (up to 95% control of damage)

Addressing Farm Sector challenges in Guyana

Innovation and Technology - Need for Innovation of alternate technologies and

Predictive
Pest and
Nutrition
Management

Simplificatio
n of Growing
Techniques
of high value
crops



Technology
Customisation and
Integration

Special
Purpose
Research
Challenges

- Using algorithm and historical data based predictive software to alert geographic farmer groups of oncoming pests and disease issues or prediction of nutrition issues through satellite imaging
- By adapting techniques, soil conditioning, Protected Farming, skills and tools to grow high value foreign plants in Guyana
- Different technologies / techniques may have been introduced but failed to make a mark in Guyana, such technologies and concepts need to be modified and customized to fit the needs of Guyana
- Special Purpose challenges to be floated for research and innovation - Like Special Farming Zones in designated Saline soil land areas where there can be farming contests which may allow some benefits to the winners and innovators

Addressing Farm Sector challenges in Guyana

Innovation and Technology - Need for Innovation of alternate technologies and

Value
Addition of
all kinds of
farming
related waste



Changes in
Farm crop
selection
and growing
practices

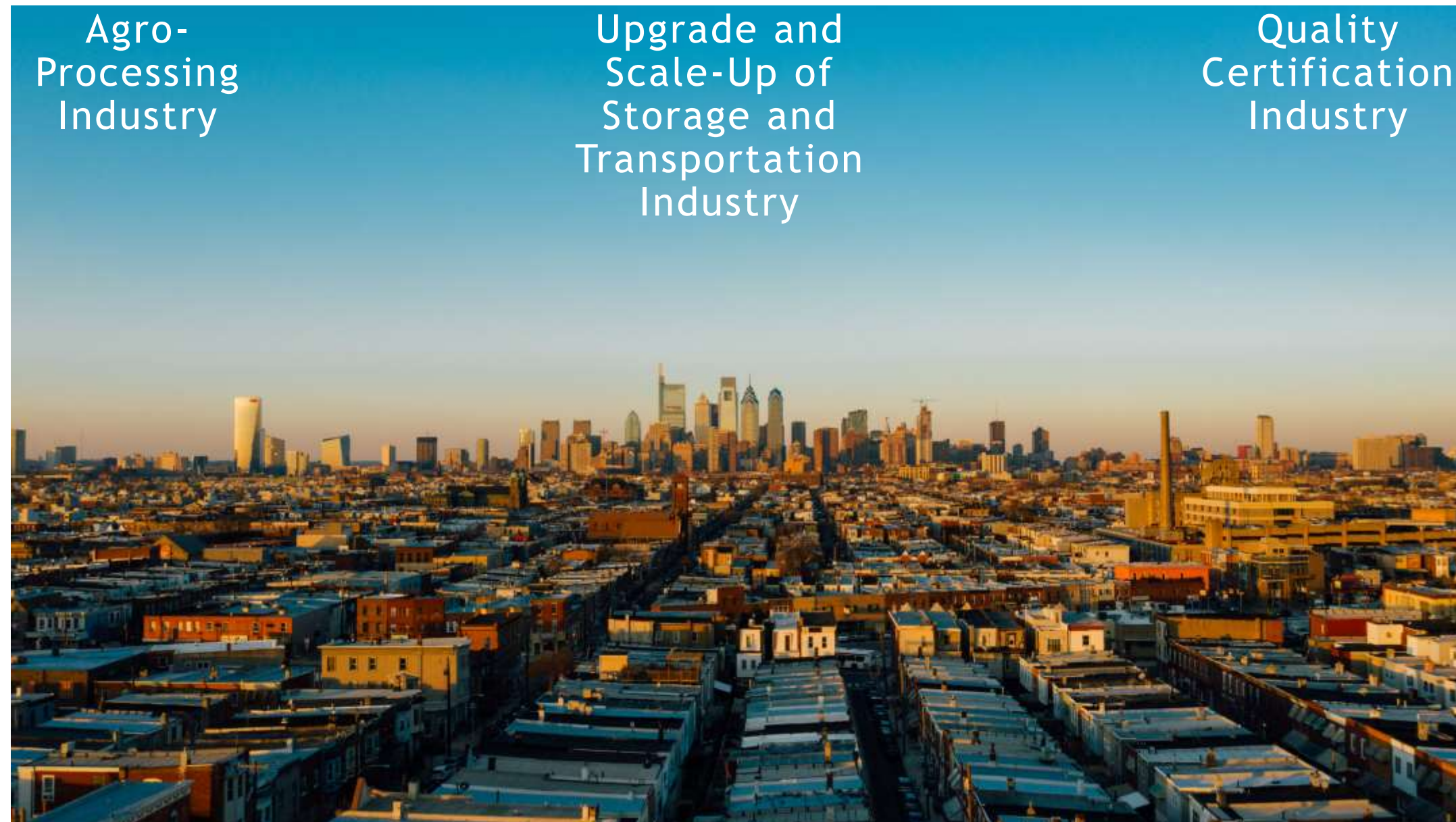
Produce Biogas, Power and Derivative Chemicals from Poultry manure, Farm waste and Agro-Processing Waste to Off-Set carbon Footprint of agriculture and other sectors.

Changes in Crop Selection and growing practices like

- Replace 155 of farmlands under Rice and Wheat with Irish Potato, Sweet Potato, Cassava, Plantain
- Develop Orchards of Golden Apple
- Increase growing area of Tomato, cabbage, leafy greens - simple farming, higher returns
- Introduce protective Farming for Tomato, Cucumber, chili, Sweet Pepper, cauliflower, broccoli during rainy season
- Introduce small scale flour mills for farmers to package their own flour and grain more profit by selling flour.

Addressing Farm Sector challenges in Guyana

Support Industry - Underdeveloped agro-processing and storage industry and poor transportation infrastructure for moving produce to markets.



- Locally beneficial and adaptable features of these industries must be developed

Addressing Farm Sector challenges in Guyana

Markets and Trade - Innovation in Market structure / Trade channels to benefit farmers



- Farmers forming Farmer Producer Groups and/or Farmer Trade Groups or such organizations to give them leverage of numbers and volume in the Agri-Business
- Branding and Marketing Services Industry to support farmers / farmer Groups launch, promote and manage their own local brands to represent Guyana in National and International Market
- Introduce user friendly and simpler trading platform for exchange and purchase of farm produce (like lets say Amazon but for farm produce and farmer directly sends goods to consumer and optimized for farmers to get the maximum return on the transaction.
- Traceability and Geo-Tagging connecting farmers to consumers to create trust and transparency

Addressing Farm Sector challenges in Guyana

Small and Micro-Business Ecosystem -

More Agro-entrepreneurship and small businesses, Limited access to financing and
credit.



- Develop Incubators for Entrepreneurs and small businesses to thrive
- Make the Agro-Startup Ecosystem friendly and benefit giving
- Introduce Agri-Business Apprenticeship
- Promote farming in all organizations with land holding
- Financing loans and subsidies for special agenda sectors like Avocado production, spices like black pepper, cardamom, star anise etc., farming Salinity Ingress-ed soils to revive land and gain produce
- Management Innovation by allowing smaller companies to do their due diligence through management services which help in running these companies

A stylized graphic of the Guyana flag, featuring a red triangle on the left, a yellow triangle in the middle, and green triangles at the top and bottom, all separated by black and white borders.

Conclusion and future prospects

Investing in sustainable agriculture can ensure food security in Guyana. The government should prioritize policies that support small farmers and sustainable practices. Continued research and development can help improve crop yields and reduce environmental impacts. Together, we can build a more sustainable future for Guyana.