Role of Research in Enhancing Sustainable Tobacco Production :

A Zimbabwean Case Study

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PRESENTATION OUTLINE

A glimpse of the Research Programme

- *Soil Health Maintenance*
- *Varieties Development*
- *Seedling Production*
- *Plant Health Management*
- *Information Dissemination*

Sustainable Tobacco Production

Kutsaga's Research Programme has perennially been purposefully designed to;

- *facilitate & enable all tobacco stakeholders - to extract utmost value from environmentally & socially responsible tobacco business practices*
- *enable growers to maximize returns from **sustainable tobacco production practices.***

Sustainable Tobacco Production

"the efficient production of quality tobacco, under conditions that limit the negative impact to the environment, in a manner that improves the socio-economic conditions of the people & their communities" **(STP Program)**

A glimpse of the Research Programme

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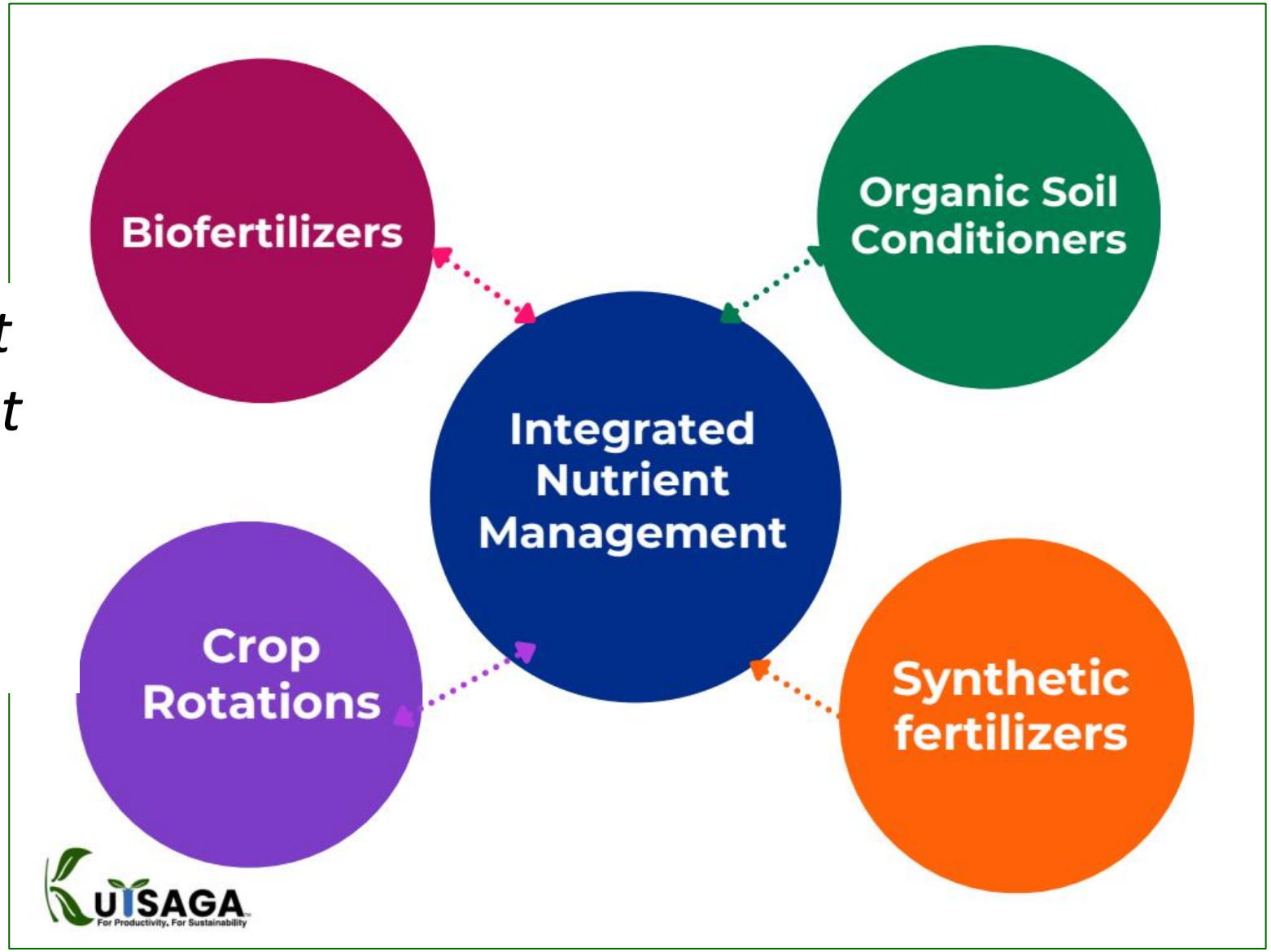
Soil Health

Soil Health - Integrated Nutrient Management

Research program aimed at coming up with options that enable an ***Integrated Nutrient Management system***



Soil Health - Integrated Nutrient Management

1. Synthetic fertilizers

- ***Soil test-based fert application***- A standard recommendation
- Enables application of the crop's exact requirements
- Ensures good crop productivity
- No unnecessary environmental contamination from overapplications

Kutsaga offers soil testing services & gives the lime & fertilizer recommendations

Soil Health - Integrated Nutrient Management

Adoption Level?

- 2 000 – 2 500 samples received annually.
  (Fertilizer suppliers & other independent labs also offer the services)
- Still lots of room for improvement. ***(given 122 000 registered growers)***

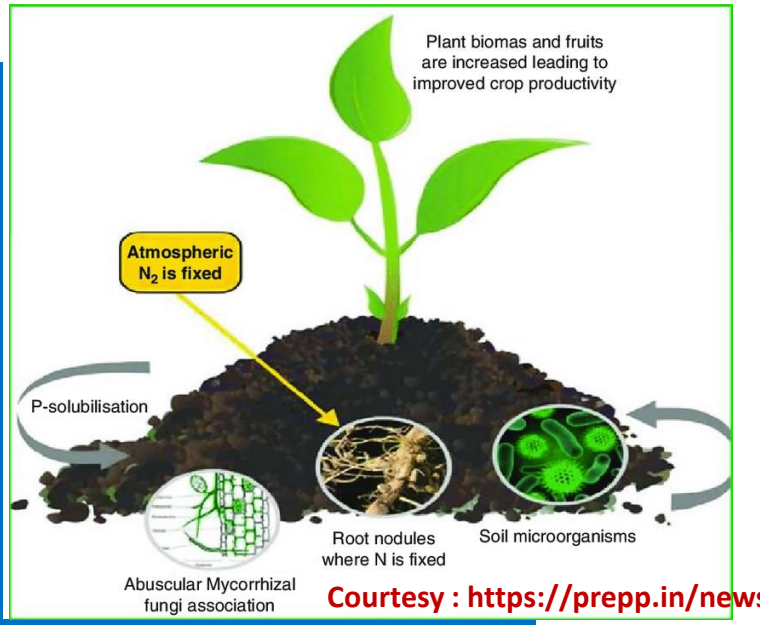
This subject continues to receive emphasis on all grower advisory platforms

SOIL HEALTH MAINTENANCE

2. Integration of Organics

- Active exploration for and & evaluation of **organic soil conditioners** for incorporation into tobacco production systems

- 2018-2022 - **6 products** tested and 2 recommended for reg in same period.



Courtesy : https://prepp.in/news/e-492-bio-fertilizers-agriculture-notes

3. Biofertilizers

- **7 formulations** evaluated - 2 recommended for registration.

Products actively marketed by suppliers – but not all are effective under Zim conditions

Soil Health Maintenance

4. Rotation Crops

- *Long standing options - Katambora grass (Chloris gayana), sunn-hemp (Crotalaria juncea).*
- *Continuous research*
- *Additional options being availed - **Chia (Salvia hispanica)**, **industrial hemp** (Cannabis sativa), **velvet bean (Mucuna pruriens)***
- *Priming/treating of relay crop seed with various biocontrol agents*

VARIETIES

Tobacco Varieties

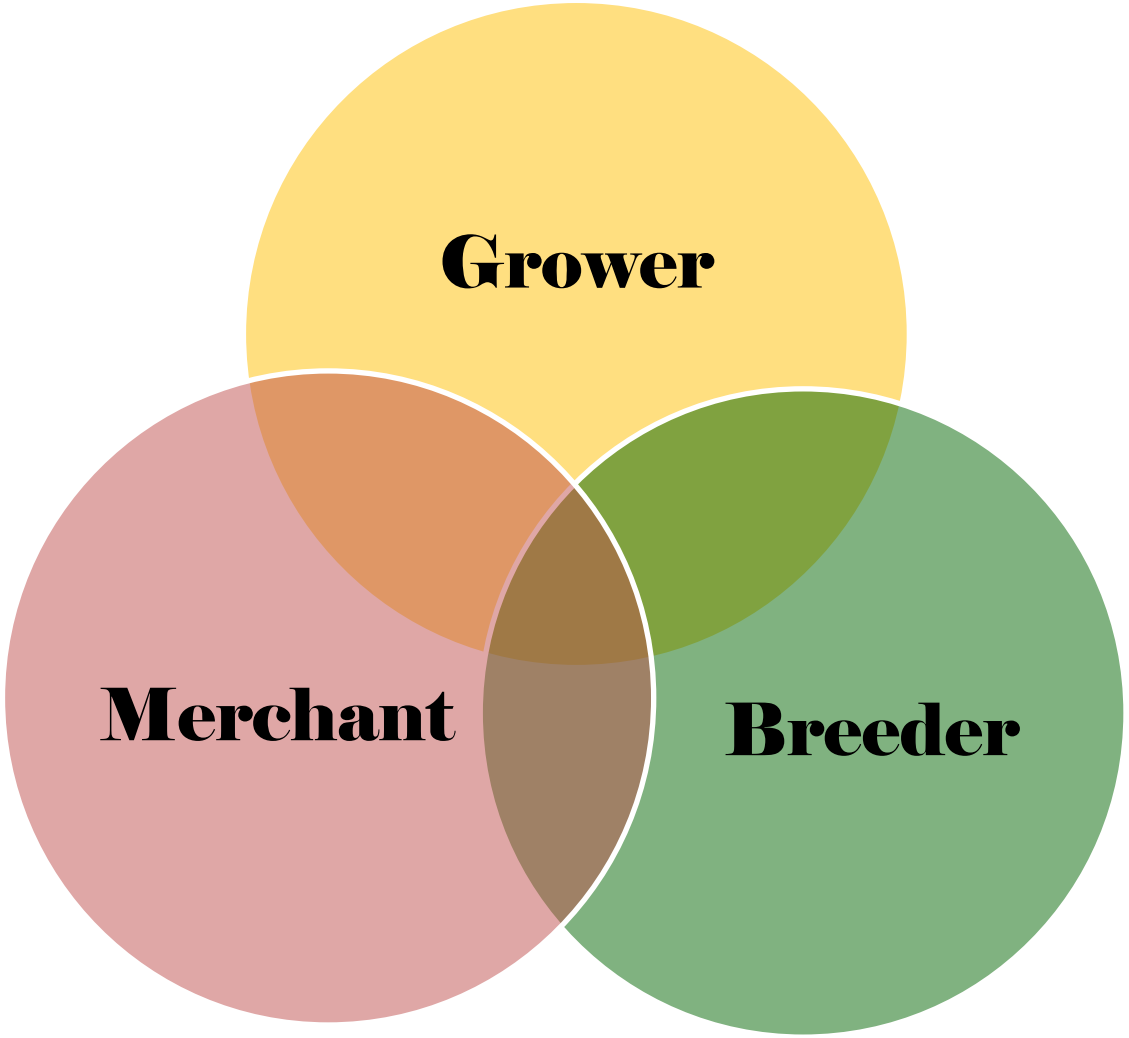
Objective - *To develop tobacco varieties that maximise grower returns & meet merchant expectations. All vars have to be;*

- *high yielding*
- *multi-disease resistant*
- *of the sought after quality*

Root knot nematode resistant variety | **Root knot nematode susceptible variety**

Variety Release

- *Protracted variety release protocol spanning 4 years*
- *Breeder, grower and merchants participate*
- *Ensures **released varieties meet both growers and merchant expectations***



Tobacco Varieties

	Type	Number
1	Flue-cured	56
2	Burley	8
3	Dark fire & dark air	12
4	Cigar wrapper	2
Total		**78**

Currently registered – 44. Older vars dropped off approved list as improved ones are developed

Tobacco Varieties

Objective - *To develop tobacco varieties that maximise grower returns & meet merchant expectations. All vars have to be;*

- *high yielding*
- *multi-disease resistant*
- *of the sought after quality*
- **"Climate Smart"**

Flue-cured varieties on limited release in 2023

Kutsaga's new 'climate-resilient tobacco varieties

- *Bred to ripen very fast to escape drought.*
- *Suited to marginal areas (low rainfall, high temperatures, & dry conditions)*
- *Will give a decent yield ~3 t /ha under drought conditions*
- *Four (4) on limited release*

Flue-cured varieties on limited release in 2023

T78	***Very fast growing & fast ripening**. High Root knot nematode resistance; **Lemon – deep lemon** cured leaf styles; Broad, dark leaves, good top growth; Resistant to 8 diseases including TMV*
T79	*Fast to medium ripening; **Bright lemon cures**; Resistant to 8 diseases including TMV; High Root knot nematode resistance*
T80	*Medium to fast growing and slow ripening; **Orange – mahogany** cured leaf styles; Resistant to 8 diseases including TMV; High Root knot nematode resistance*
T81	*Very fast growing and fast ripening; **Deep lemon –orange cures**. Resistant to 8 diseases including TMV; High Root knot nematode resistance*

Seedling Production

Float tray Seedling Production

- *Method eliminates the need for broad spectrum fumigants.*
- *Five-fold reduction in seedbed area - a ha tobacco.*
- *Reduced use of agrochemicals & water for seedling maintenance.*
- *Reduced labour requirements*

Now also widely adopted for horticultural seedling production.

Environmentally friendly Seedling Production

Some challenges growers face

- *Damping off diseases if trays are not well cleaned.*
- *Salt injury in late sowings*
- *Premature flowering of seedlings*

Remedy - Continuous training & advisory to assist in managing these challenges

Salt & cold injury on tobacco seedlings

Environmentally friendly Seedling Production

Some challenges growers face

- *Damping off diseases if trays*
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Troubleshooting Some Float Seedbed Issues

By C. Chinheya & S. Dimbi

Introduction

Production of tobacco seedlings using float trays is an excellent and proven way of producing even, well-hardened seedlings with a vigorous root system that enables seedlings to take off faster and withstand extended periods without water in the field. However, some farmers reported issues with their float seedbeds last year (2020) including Pythium root rot, salt injury, uneven growth and early flowering. In some instances, they reported not being able to use up to nearly half of their floatbed seedlings.

Tobacco Research Board Kutsaga addressed these areas of concern in order for farmers to be informed and prepared for the 2021 seedbed season.

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MITIGATING SALT INJURY IN THE TOBACCO FLOAT SEEDLING PRODUCTION SYSTEM

By F. Zinyandu. Kutsaga Research Station

About Salt Injury

Salt injury of seedlings grown under the float tray system (Figs 1 and 2) occurs when there is excessive evaporation, usually triggered by windy conditions or extreme temperatures. Under excessive evaporation conditions, the pond water moves by capillary action from the pond to the surface of the growth medium where it evaporates and leaves behind fertilizer salt deposits. If these conditions persist the process triggers the continuous movement of water and salts through the seedling, resulting in an accumulation of salts on the medium and the seedling. This type of injury can occur naturally on the growth medium from the pond applied fertilizers or can be introduced through saline irrigation water, over fertilization or the use of a salt-contaminated mulch.

Symptoms

pesticide phytotoxicity which display brown or yellow patches on seedling leaves and leaf bronzing symptoms.

Salt injury is common in late sown (July and August), as conditions will be warmer during their growth period. Young seedlings are more vulnerable to salt injury because of their succulent nature, compared to older seedlings which are more tolerant.

Fig 1: Salt injury early symptoms.

Plant Health Management

Tobacco Crop Protection Agents Research

Programme deliberately designed with the objectives;

i. **eliminate broad spectrum synthetic CPAs** from the list of recommended products.

ii. search for, evaluate & ***avail greener crop protection agents*** (microbial, mineral-based, plant-based etc, etc)

iii. continuously ***avail new innovative products***

TOBACCO IPM

1. Host Plant Resistance
2. Cultural Control
3. Legislative Cont
4. Biocontrol
5. Synthetic Pesticides

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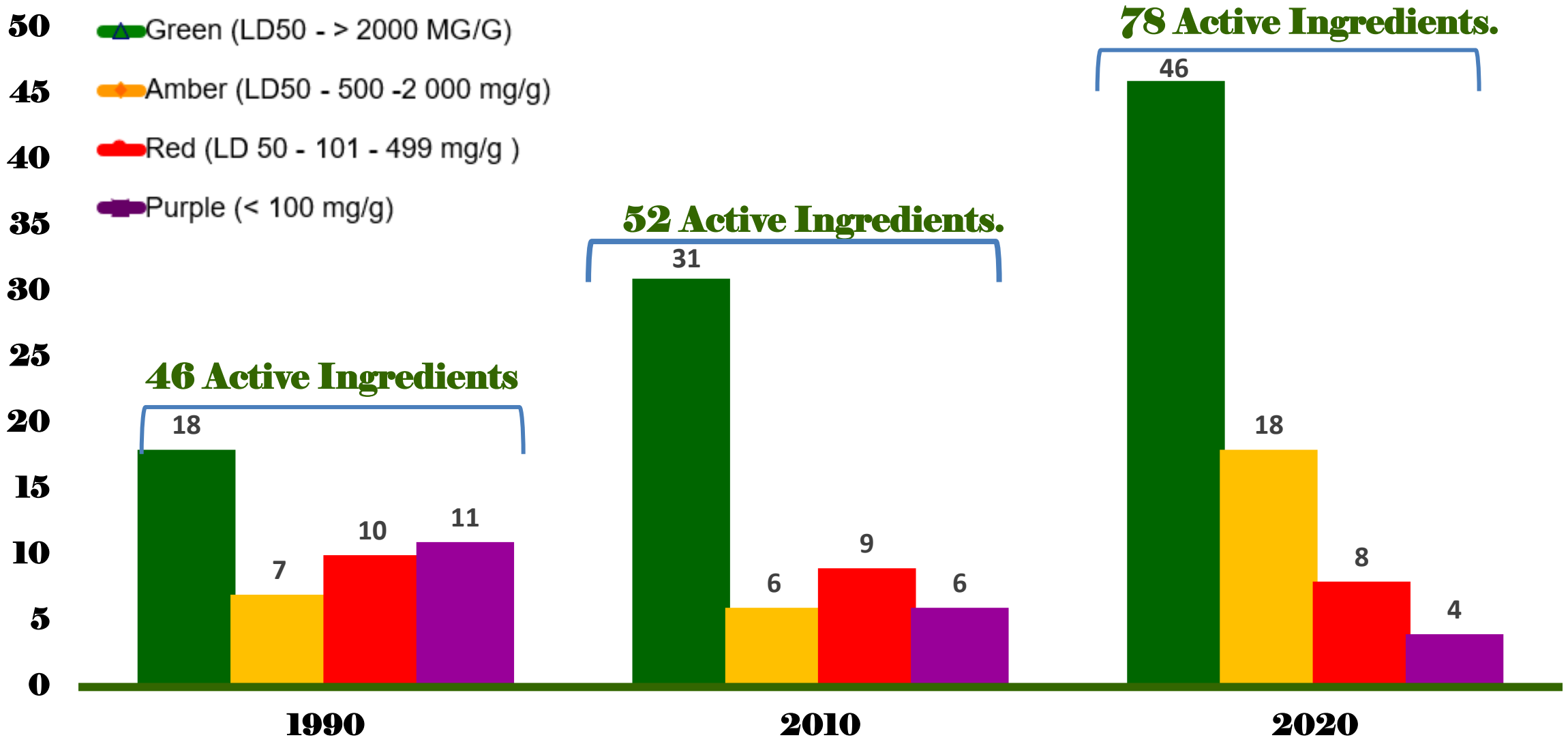
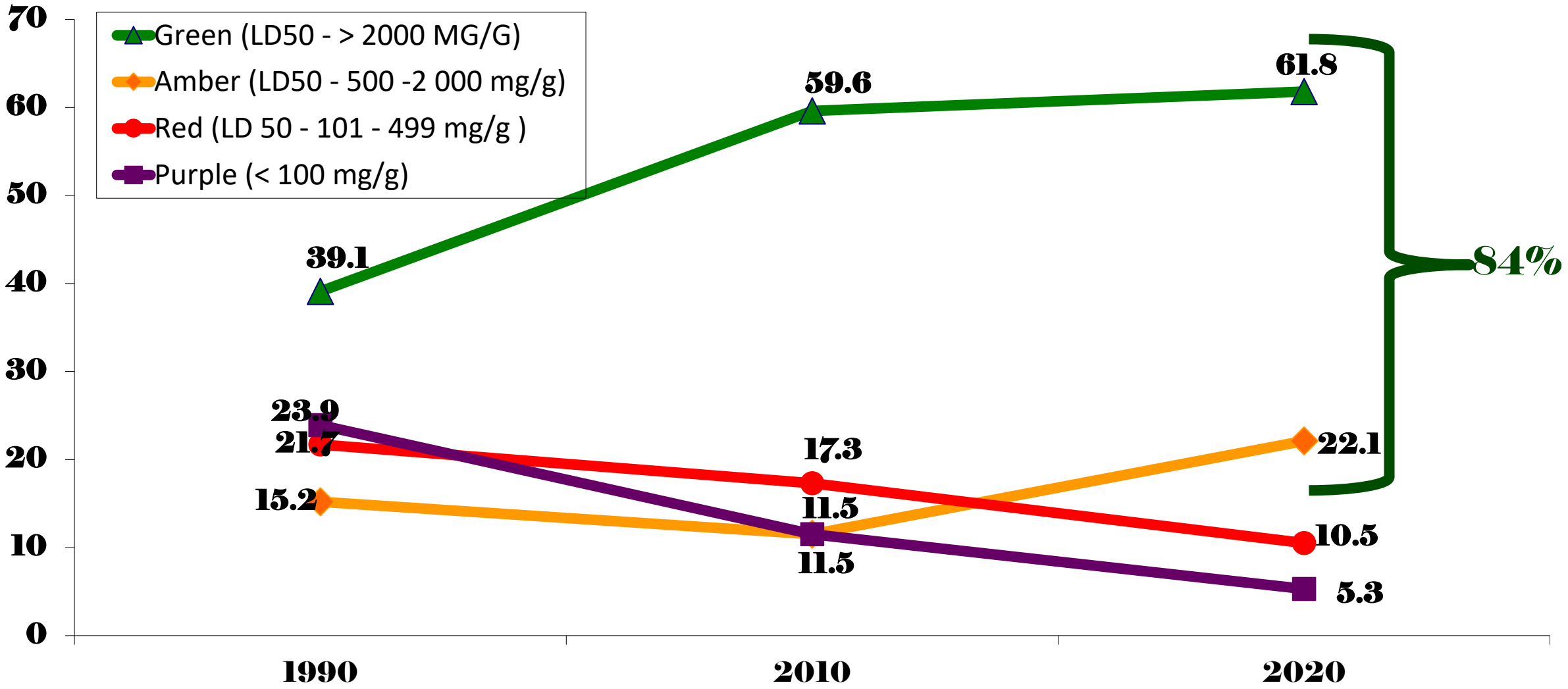
CPAs Registered on Tobacco in Zimbabwe



ONLY REMAINING PURPLE LABEL PRODUCTS



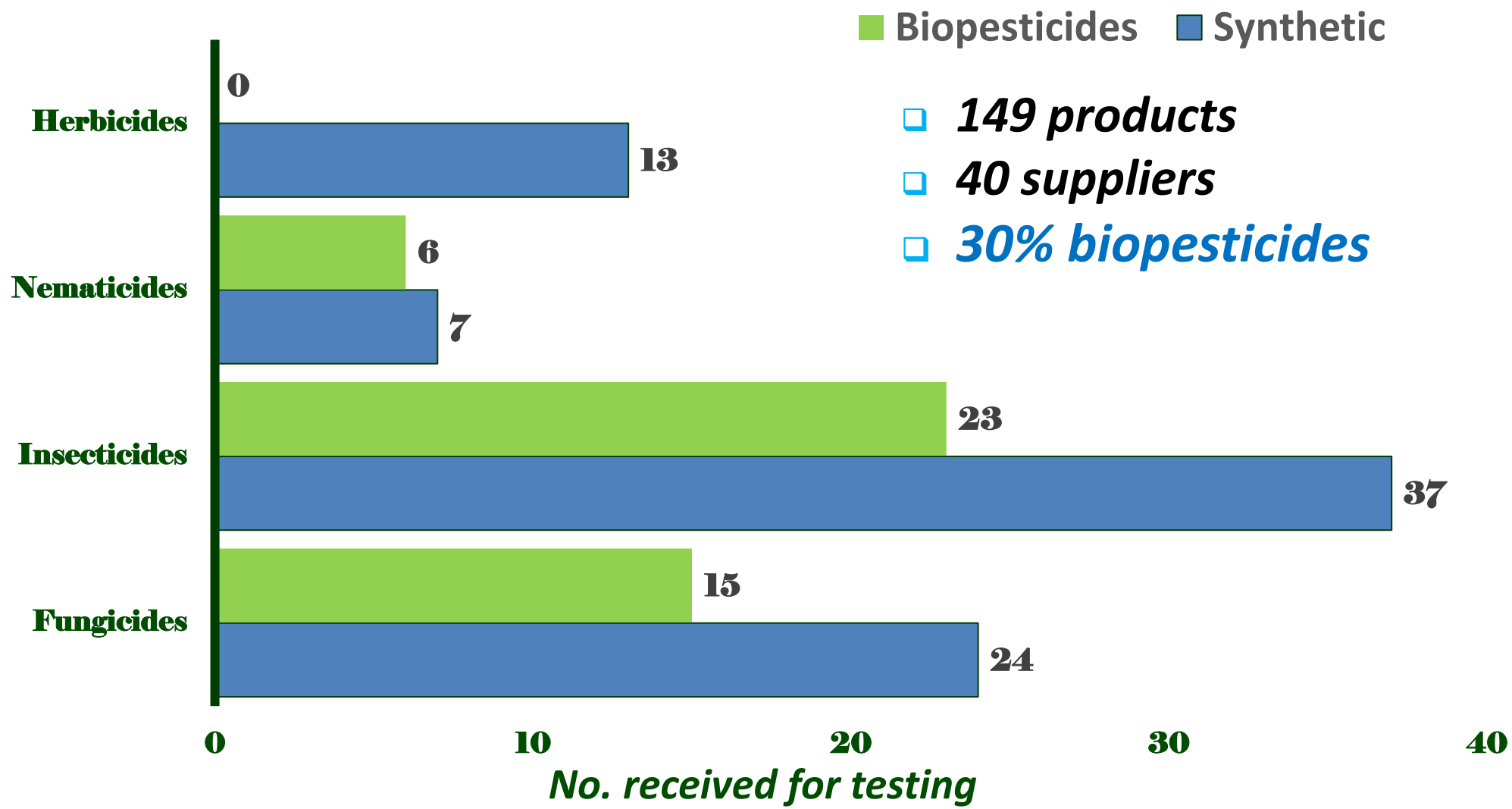
ONLY REMAINING PURPLE LABEL PRODUCTS

PRODUCT	CLASS	TYPE
i. 1.3 Dichloropropene	Organochlorine	Nematicide
ii. Metham Sodium	Carbamate	Nematicide
iii. Oxamyl	Carbamate	Nematicide
iv. Fenamiphos	Organophosphate	Nematicide

ONLY REMAINING PURPLE LABEL PRODUCTS

PRODUCT	CLASS	TYPE
i. **Fluopyrum**	(Bayer & Nihon Nohyaku)	Nematicide
ii. **Fluensulfone**	(Bayer & ADAMA)	Nematicide
iii. **Cyclobutrifluram**	(Syngenta)	Nematicide
iv. **Nemguard**	(NEMguard®)	Nematicide

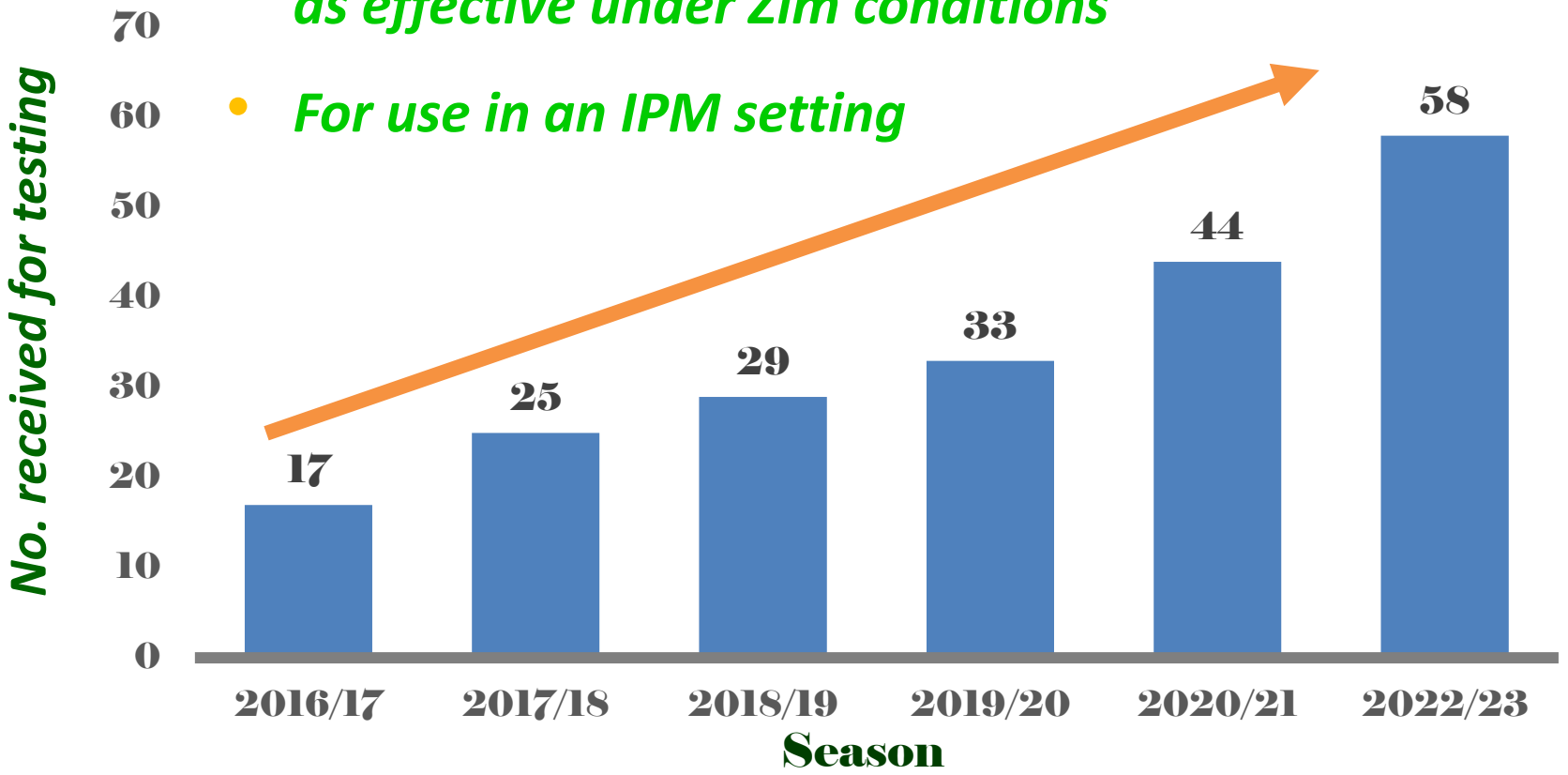
Agrochemicals Under Evaluation – 2023_24



- *149 products*
- *40 suppliers*
- *30% biopesticides*

Trends in biopesticides & biofertilizers receipts

- *Includes biofungicides, bioinsecticides, bionematicides, biosuckercides and biofertilizers*
  - *Trend has been only 25 -30% get registered as effective under Zim conditions*
  - *For use in an IPM setting*



Approved Agrochemicals List

- *List of approved agrochemicals availed to growers*
- *List updated annually, but **quarterly reminders** sent out*
- *List of products that are **"no longer recommended for use"** included.*

TABLE 2: Agrochemicals no longer recommended for use on tobacco

ACTIVE INGREDIENT	CATEGORY
Aldicarb	Nematicide
Acephate	Insecticide
Fenvalerate	Insecticide
Methamidophos	Insecticide
Monocrotophos	Insecticide
Thiodicarb	Insecticide
Benomyl	Fungicide
Alachlor	Herbicide
Dimethenamid	Herbicide
Metolachlor	Herbicide
Trifluralin	Herbicide
Butralin	Growth Regulant
Chlorpyrifos	Insecticide
Methomyl	Insecticide
Pendimethalin	Suckercide

Sent by Kutsaga as a service to growers to ensure sustainable and responsible tobacco production

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Please address all correspondence to the Chief Executive Officer

Enhancing sustainable CPA use

- Efforts to go greener evident.
- Need to continually sell the "**narrow-spectrum CPA in an IPM setting**" to growers
- *Important to then assist growers incorporate new products into **effective IPM systems***

Sustainable Curing

Sustainable Tobacco Curing

1. Efficient curing systems

- ***Rocket barn*** *and the* ***KCC1 barn*** *- capable of saving curing fuel wood by 47-50%.*
- ***Efforts underway by extensionists & tobacco merchants to ensure all s/scale growers adopt/convert conv barn furnaces****.*

2. Alternative curing fuels

Research underway to evaluate ***alternative tree spp; biomass briquettes,*** *biogas & LPG.*

Sustainable Tobacco Curing

3. Afforestation

- *Kutsaga annually producing eucalypt seedlings. Most supplied to Sustainable Afforestation Association (SAA).*
- *SAA has established ~ 20,000 hectares of commercial eucalyptus plantations since 2013*
- *Small scale growers being urged to establish own woodlots*

Year	Quantity
2013	800 000
2014	3 700 000
2015	2 600 000
2016	3 200 000
2017	3 500 000
2018	2 000 000
2019	1 000 000
2020	1 400 000
2021	1 400 000
2022	1 000 000
2023	1 200 000

Information Dissemination

Researcher/grower interaction platforms

Extremely important that;

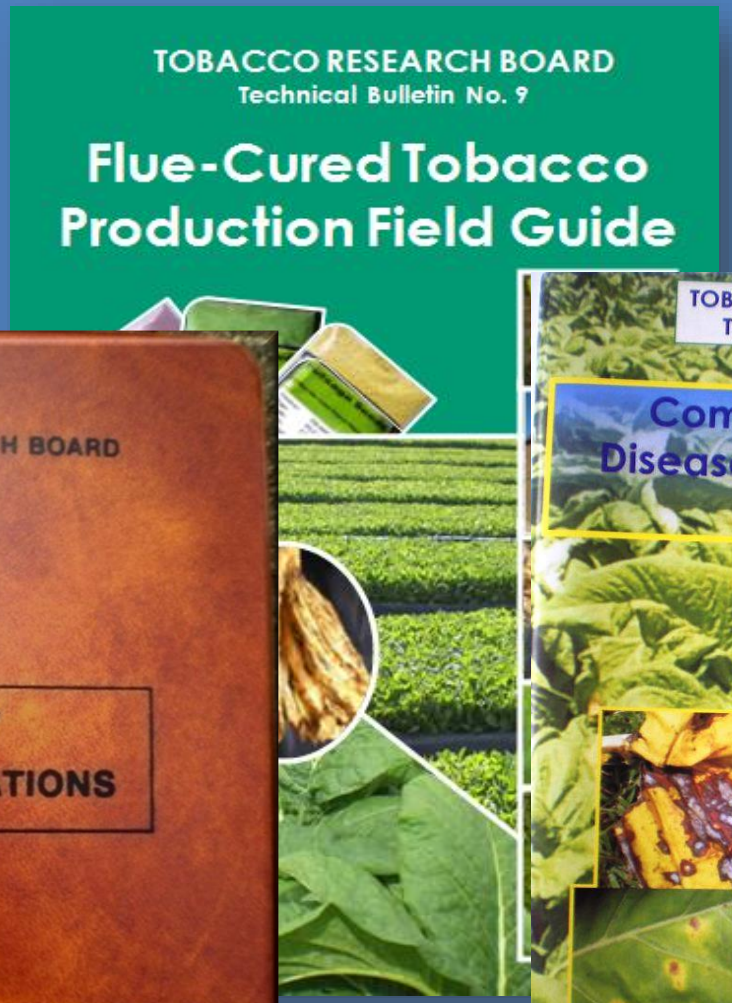
- *research information & advisory reach the grower*
- *The grower contributes to the research programme*
- *The grower and the researchers interact*

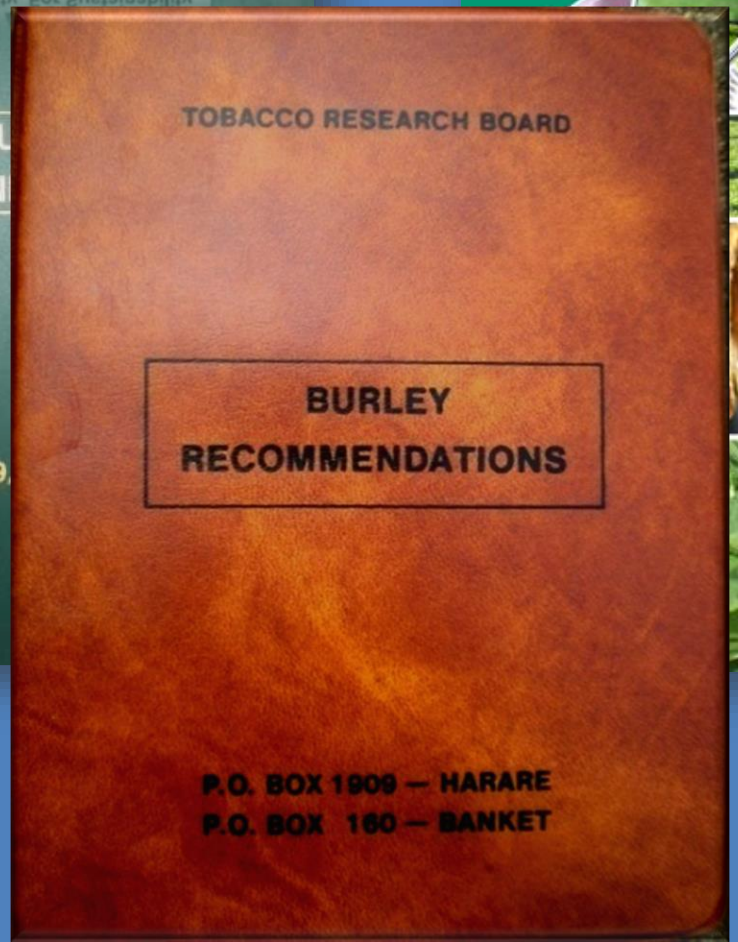
Done through various researcher/ grower interaction platforms

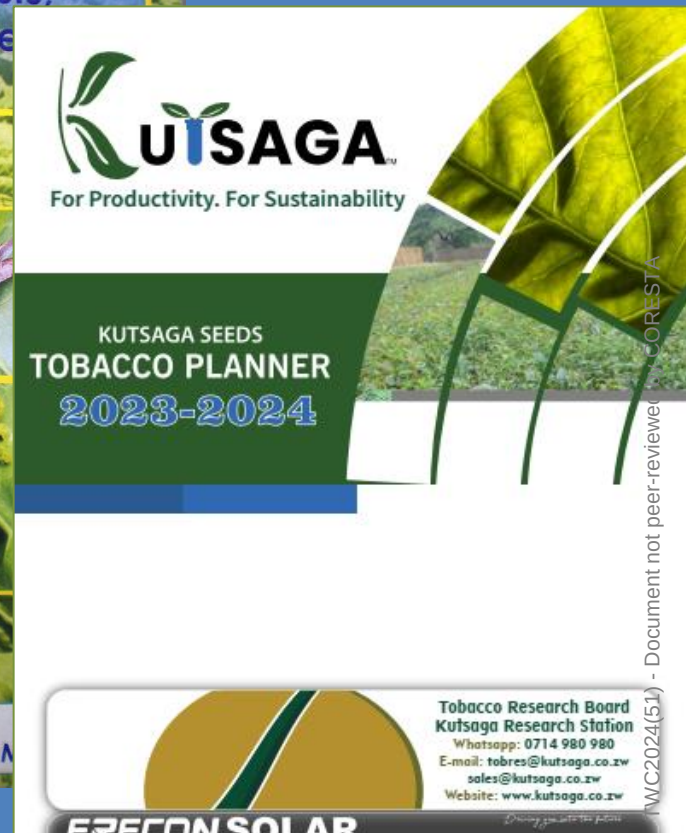
Researcher/grower interaction platforms

- *Field days/discussion forums*
- *Calendar-based training sessions*
- *Grower drop-in for advisory*
- *Field visits for problem diagnosis & advisory*
- ***`Handbooks & Technical Guides***
- ***Advisory Notes/Farmer Magazine Articles***
- ***The Kutsaga Plant Clinic***

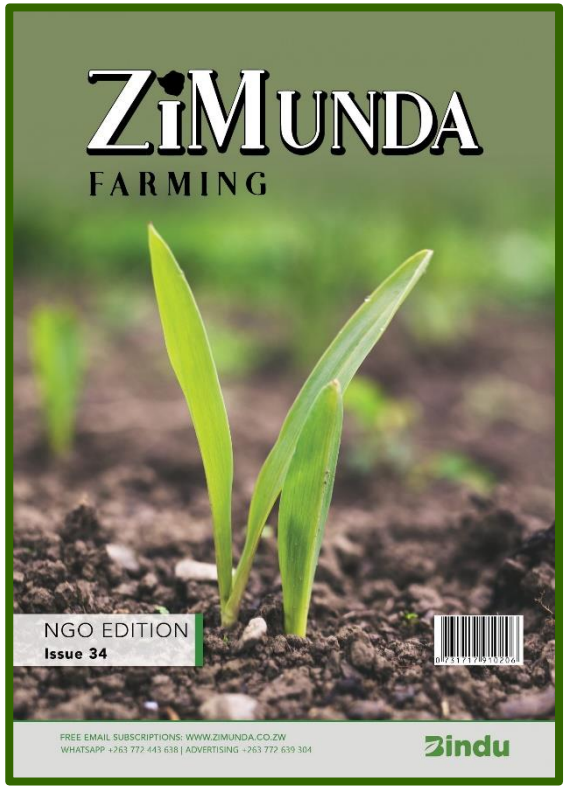
Some Kutsaga Handbooks and Technical Guides

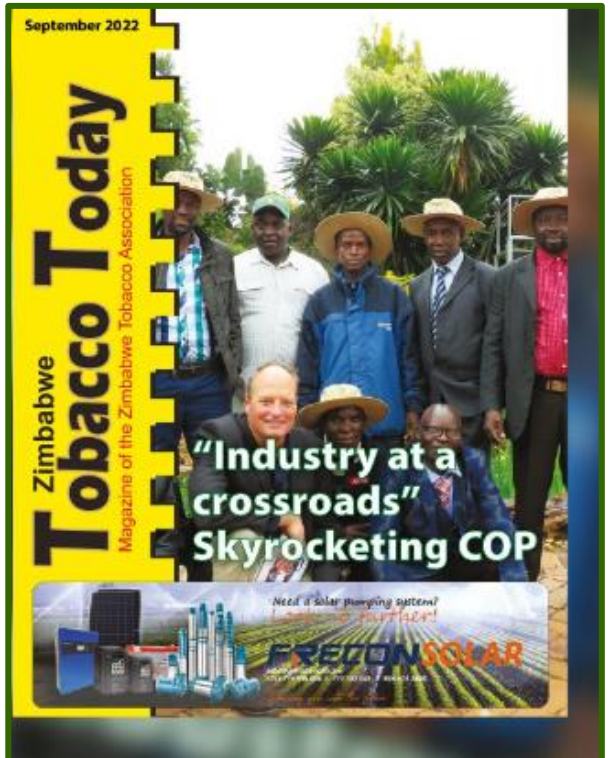


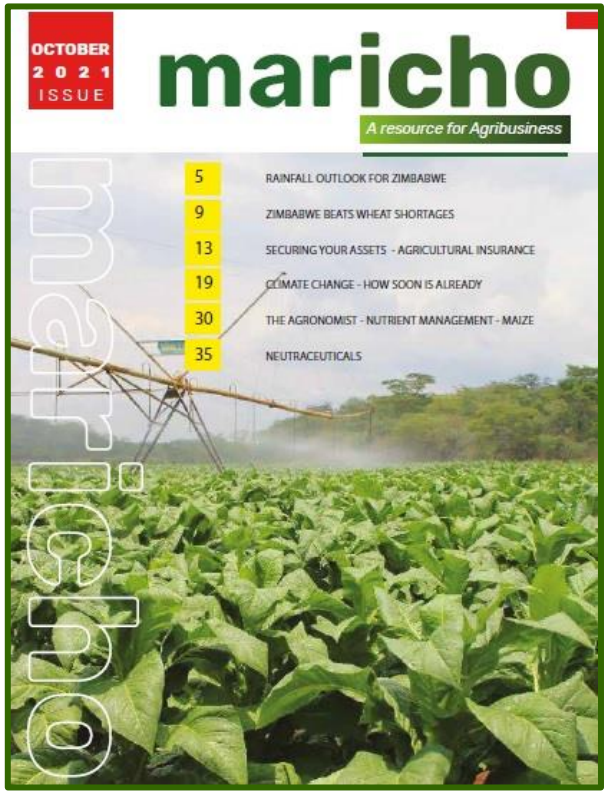




Publications July 2022 – June 2023			
i.	**Dear Grower Advisory Notes**	**11**	**30**
ii.	**Farmer Magazine Articles**	**19**	
iii.	Peer review publications	9	
iv.	Abstracts for conferences	8	



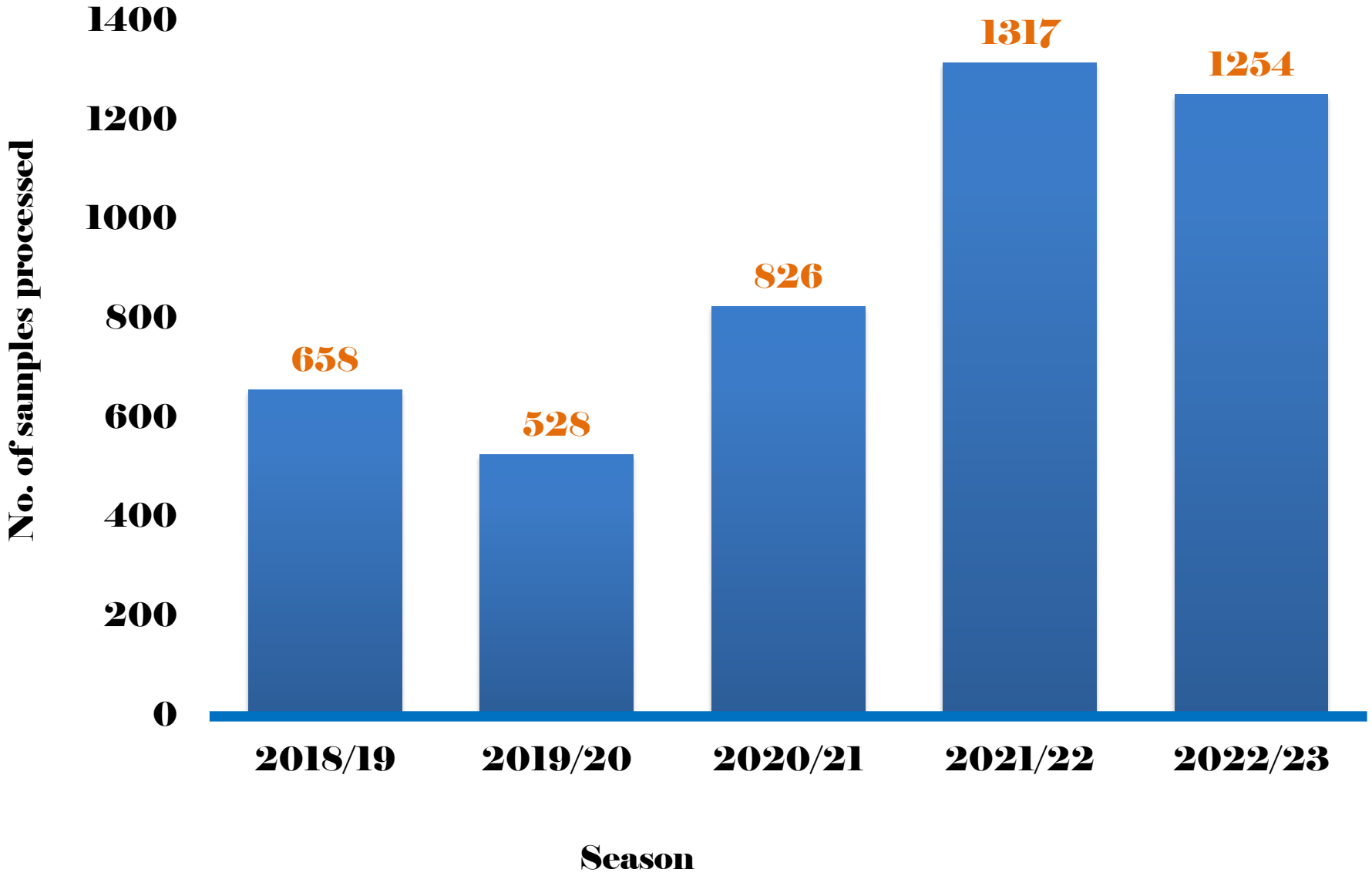




The Kutsaga Plant Clinic

- Aims to **timely provide accurate, up-to-date pest management information** to growers.
- Growers submit samples of affected plants or invite researchers to the field for problem diagnosis & management advisory.
- Effective in preventing the indiscriminate use of agrochemicals
- Efforts underway to implement e-Plant Clinic (App).

The Kutsaga Plant Clinic



Summary

- *Research program designed to enhance sustainable production of tobacco*
- *Win some, lose some, in the evaluating & selecting greener products*
- *Important to engage the grower to bring awareness to the 'paradigm shift' … from single broad spectrum products to* ***…Integrated approaches to Soil & Plant Health Management***

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Thank You

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