49th Tobacco Workers Conference : *20-23 Jan 2020*

AGROCHEMICAL USE ON TOBACCO

Zimbabwe Continues to Go Greener

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Tobacco Research Board, ZIMBABWE

Presentation Outline

- Agrochemical (Pesticide) use on tobacco in Zimbabwe
- The Registration Process
- The Zimbabwean Pesticide Classification System
- Changing trends in Pesticide Classes registered for use on tobacco
- Progress on the reduction & elimination of Highly Hazardous Pesticides (HHPs).

Agrochemical use….

- Features prominently in tobacco pest management
- Highly recommended as part of an **IPM** strategy
- However, to **enable sustainability** pesticide use is regulated.

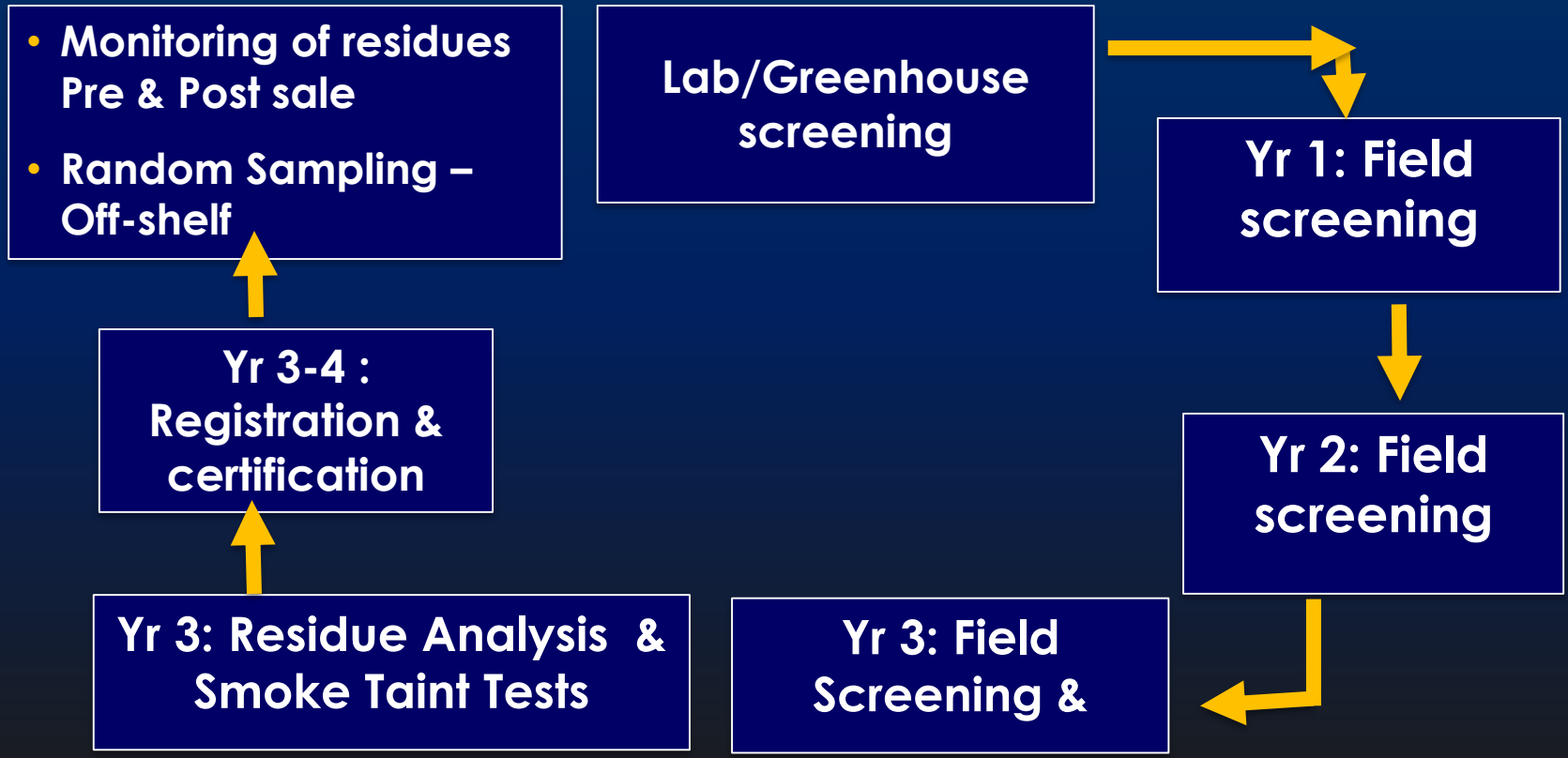
BEFORE THEY CAN BE USED ON TOBACCO…..

- **All pesticides must be approved & registered**

- TRB thus mandated by an Act of Parliament to **evaluate & countenance** all pesticides for use on tobacco

The process takes 3-4 yrs

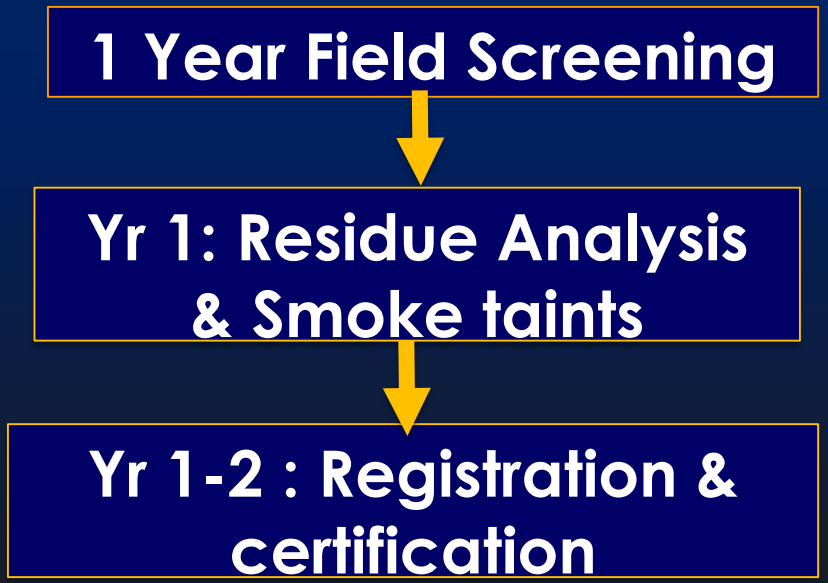
THE EVALUATION PROCESS
New Active Ingredient



The Evaluation Process
Already Registered Active Ingredient

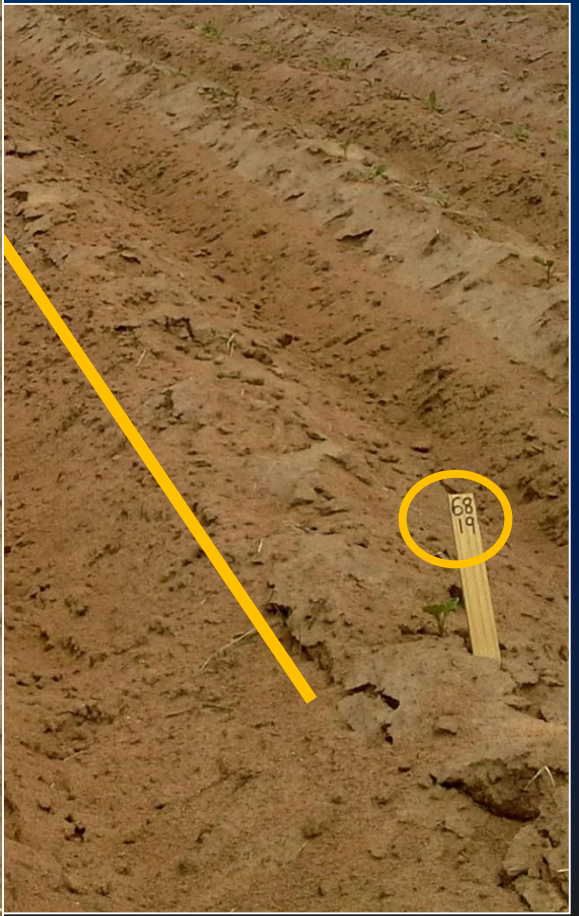
Active Ingredient already registered but the CPA is….

- From a **new source**
- A **new formulation**



100% LOSS TO PHYTOTOXICITY AFTER CHANGE OF FORMULATION

GE OF FORMULATION



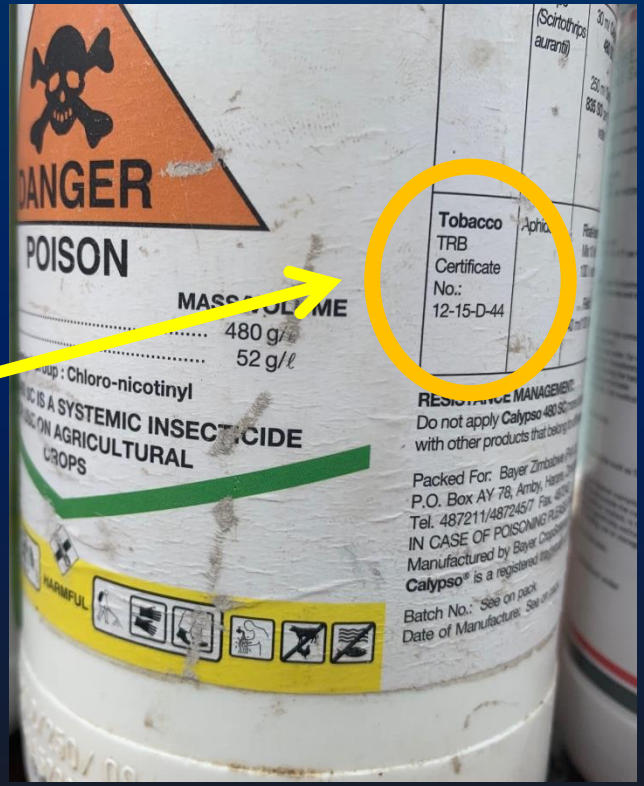
THE PESTICIDE APPROVAL PROCESS

Operational since 1964. Growers provided with information on;

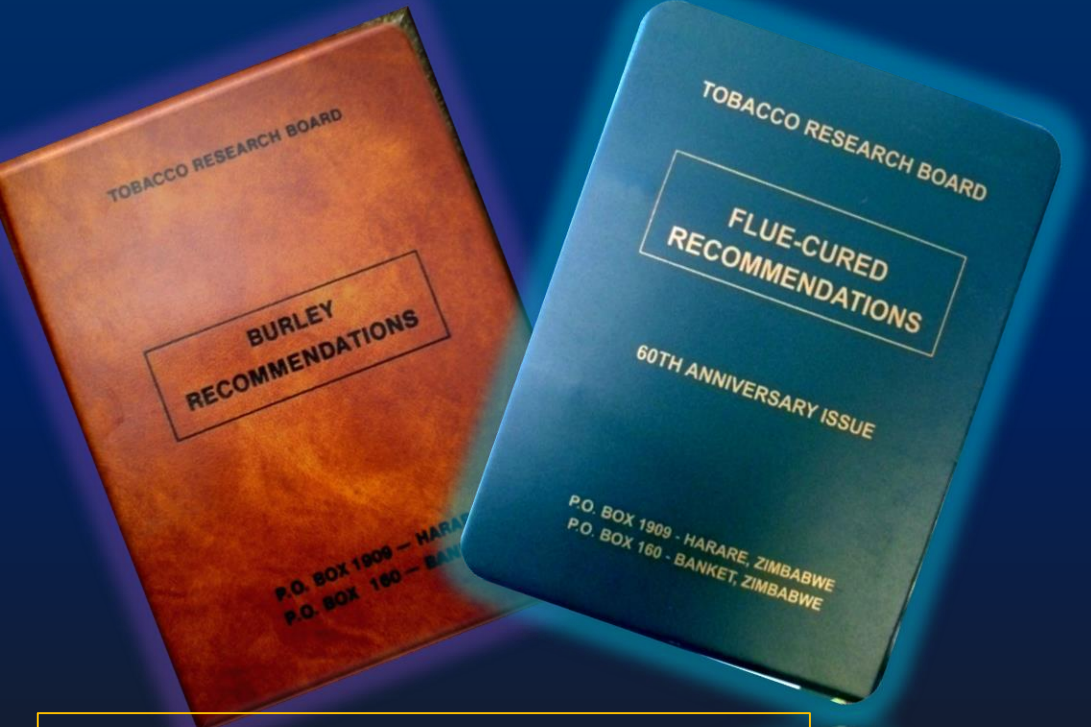
- ***Minimum effective dosage rate***
- ***Appropriate time of application***
- ***Best and safest method of application***
- ***The appropriate protective clothing* (for the CPA's Toxic Category)**

AFTER SUCCESSFUL TESTING….

- Agrochemical supplier allocated a certificate
- All approved products allocated a **TRB certificate Number** which appears on the product label
- T/growers know to purchase only products with **a valid the TRB certificate Number**



ADVISING GROWERS ON LISTS OF APPROVED CPAs



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UPDATED LIST OF PESTICIDES APPROVED FOR USE ON TOBACCO IN ZIMBABWE

October 2009

Chemical Name	Trade Name	Old TRB number	Current TRB number	Expiry date
AGRICURA (PVT) LTD				
Acephate	Acephate 75SP	05-09-D-82	09-12-D-93	29.07.2012
Alachlor	Alachlor Herbicide 48 EC	05-07-C-92	07-10-C-149	30.06.2010
Chlorpyrifos	Chlorpyrifos 48 EC	05-09-D-56	09-12-D-77	29.07.2012
Copper oxychloride	Copper Oxychloride 60 FW	05-07-B-85	07-10-B-148	31.01.2010
Copper oxychloride	Copper Oxychloride 85 WP	08-11-B-29	09-11-B-57	29.11.2011
Dimethoate	Dimethoate 40	05-09-D-57	09-12-D-87	29.07.2012
Ethylene dibromide	Minifume EDB	05-09-E-124	09-12-E-89	29.07.2012
Fenvalerate	Fenvalerate 20 EC	05-09-D-58	09-12-D-88	29.07.2012
Haloxyfop-R-methyl ester	Gallant Super	N/A	09-7-C-162	26.09.2010
N-decanol	Deka	05-09-G-117	09-12-G-92	29.07.2012
Oxamyl	Nemat 310L	05-09-E-90	09-12-E-91	29.07.2012
Pendimethalin	Agritop EC	05-08-G-93	08-11-G-18	09.05.2011
Trifluralin	Trif	05-09-C-72	09-12-C-90	29.07.2012
Propaquizafop	Agil 100 EC	06-09-C-141	09-12-C-111	29.07.2012
Chlorothalonil	Bravo 500 SC	05-09-B-89	09-12-B-112	29.07.2012
Triadimenol	Shavit 25 EC	06-09-B-143	09-12-B-113	29.07.2012
ALMOND AGROCHEMICALS (PVT) LTD				
Acetamiprid	Acetamark 20SP	N/A	09-10-D-94	17.06.2010
BAYER ZIMBABWE (PVT) LTD				

Lists in the Handbooks of recommendations

Website

Newsletters

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24 July 2019

To: All Tobacco Growers

cc: Contractors

Merchants

Agrochemical Companies

Dear Grower

AGROCHEMICALS APPROVED BY THE TOBACCO RES 2019

The agrochemicals approved for use on tobacco by the Tobac third quarter of 2019 are shown in Table 1. Any agrochemica either not currently countenanced by the TRB or has be approved agrochemicals based on the provisions of the ne Service which came into effect on 1 July 2011. The list of

TABLE 1: AGROCHEMICALS APPROVED FOR USE ON TOBACCO – 24 JULY 2019

CHEMICAL NAME*	TRADE NAME	COMPANY	TRB CERT. NUMBER	EXPIRY DATE
FUNGICIDES				
Acibenzolar-s-methyl[G]	B			
Azoxystrobin[G]	A A O			
Azoxysrobin+ difenoconazole[G]	Si E O Si A			
Chlorothalonil[G]	C B C C C			
Difenoconazole[G]	D			
Copper oxychloride[A]	C C C C C			
Fluoxystrobin + Chlorothalonil[G]	E			
Fluoxystrobin +	E			

TABLE 2: AGROCHEMICALS WHICH HAVE BEEN DROPPED FROM THE LIST OF TOBACCO-APPROVED AGROCHEMICALS

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	Growth regulant

DROPPING OF AGROCHEMICALS FROM THE LIST

- Many effective but toxic products continually being dropped from the list
- A deliberate attempt to **eliminate toxic red & purple label products**
- While actively screening & **availing greener replacements**
- Ensure growers have a **wide range of options** to chose from

HOW WELL HAVE WE DONE IN ELIMINATING THE TOXIC CATEGORY PESTICIDES

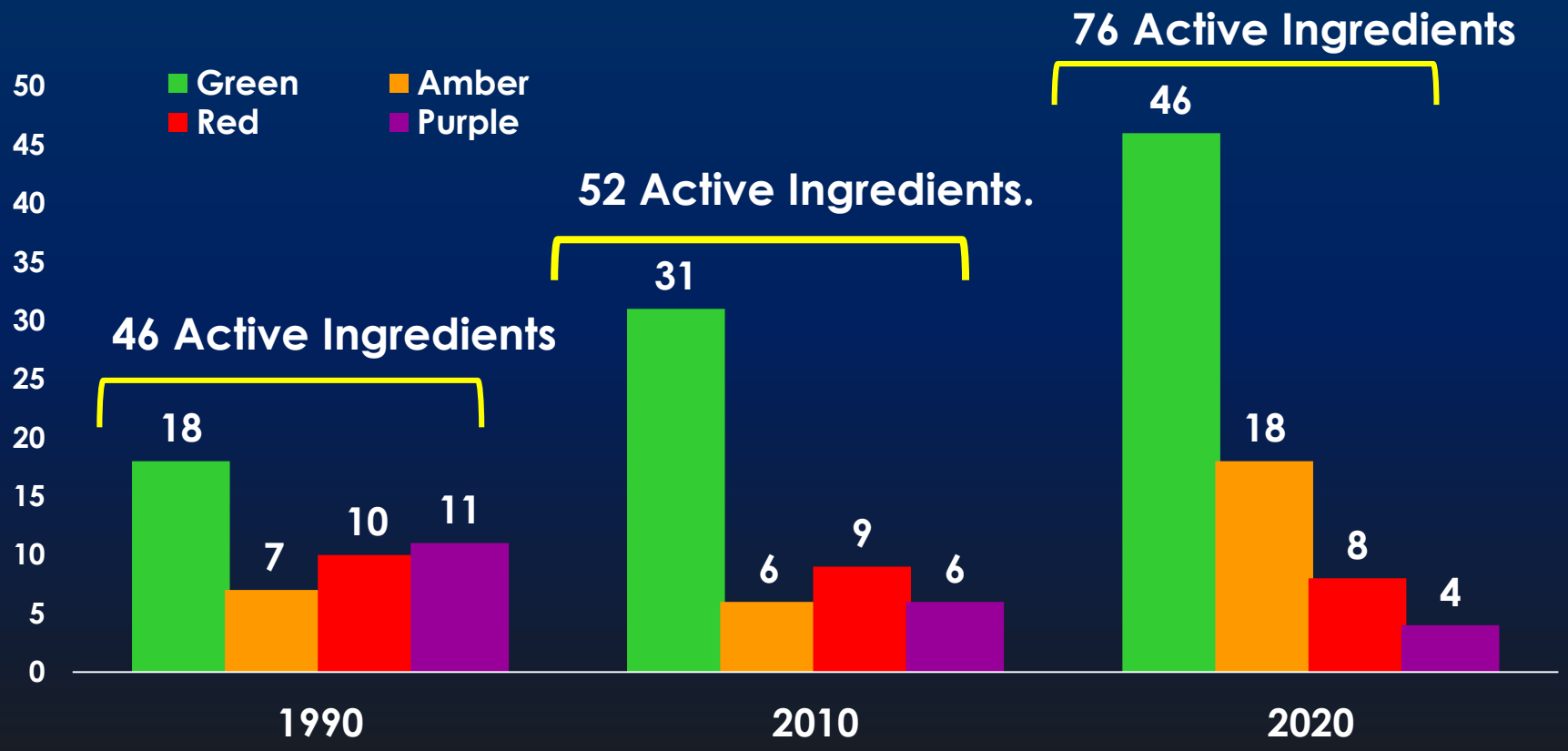
METHOD USED

A snapshot of the **Handbook Of Recommendations**

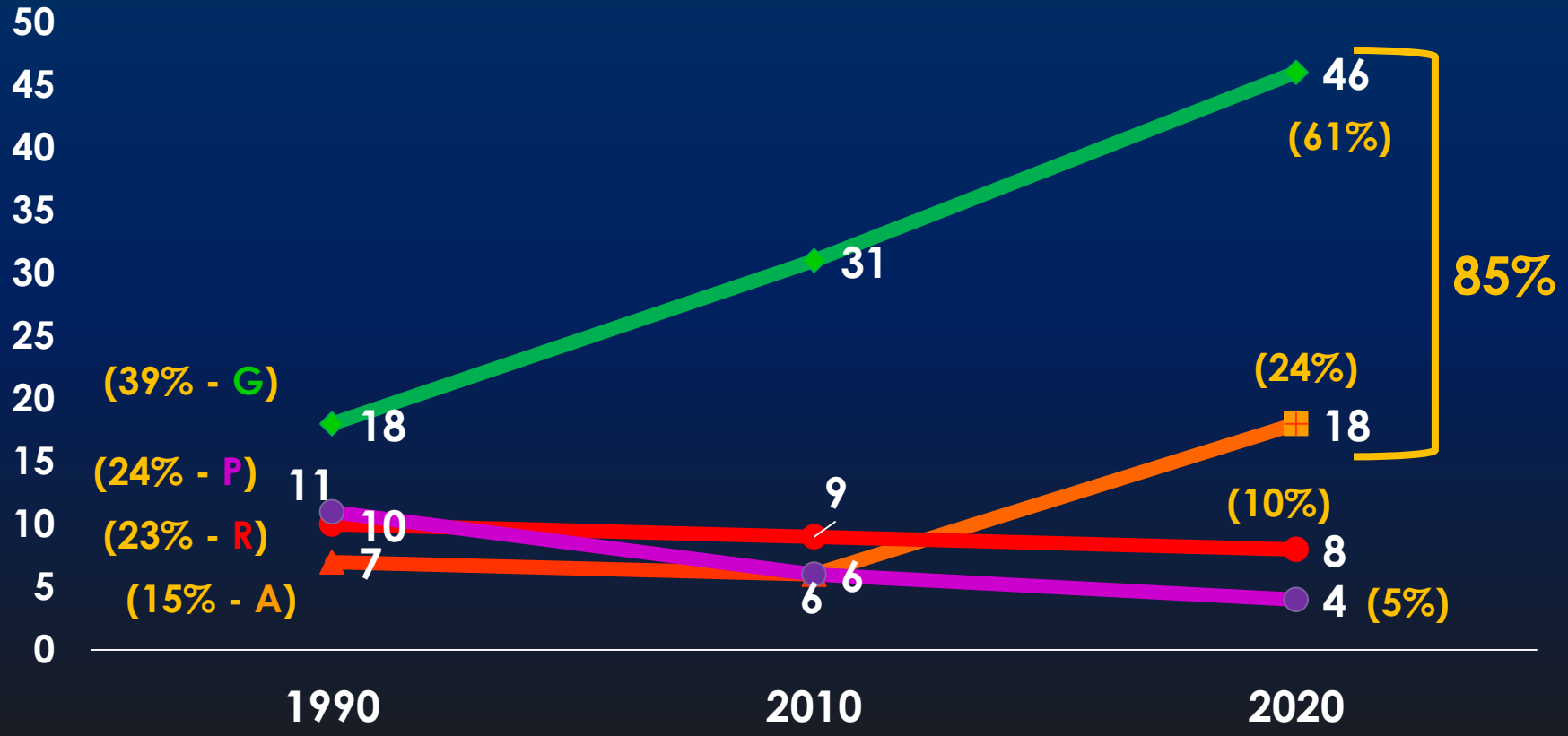
Listed the approved Agrochemicals

- **Year 1990**
- **Year 2010**
- **Year 2020**

CPAs REGISTERED FOR USE ON TOBACCO



Registered Agrochemical by Class



SOME OF THE ELIMINATED RED & PURPLE CPAs

Aldicarb		Carbamate
Methamidophos		Organophosphate
Methyl bromide		Organobromide
M[illegible]os		Organophosphate
Ethyl[illegible]romic[illegible](EDB)		-
D[illegible]foton[illegible]es		Organothiophosphate
[illegible]		Pyrethroid
Acephate/Chlopyrifos		Organophosphate
Thiodicarb		Carbamate
Methomyl		Organophosphate

REMAINING CPAS IN 2020

PRODUCT		CLASS
1.3 Dichloropropene	Organochlorine	Nematicide
Metham Sodium	Carbamate	Nematicide
Oxamyl	Carbamate	Nematicide
Fenamiphos	Organophosphate	Nematicide

RECENTLY REGISTERED NEMATICIDES

NEMATICIDE	YEAR REGISTERED	TOXICITY LABEL
Fluopyram (G)	2015	LD_{50} > 2000 mg/kg
Abamectin (G) *Streptomyces avermitilis*	2017	LD_{50} > 500 mg/kg
Fluensulfone (A)	2018	LD_{50} > 500 mg/kg

Do an excellent job especially in combination with resistant cultivars and good rotations

OTHER AGROCHEMICALS ON THEIR WAY OUT....

MORE ON THEIR WAY OUT....

THE AGROCHEMICAL

Neonicotinoids:

Imidacloprid, Thiacloprid

Thiamethoxam, Acetamiprid

Phenyl pyrazole : Fipronil (A)

Deltamethrin (G)

Colony collapse disorder

EU Court Upholds Ban on 3 Bee-Killing Insecticides

BARBARA LEONARD May 17, 2018

(CN) – Three neonicotinoid insecticides will remain banned in Europe, the General Court ruled Thursday, finding the measures justified to protect honeybees.

Regulators at the European Commission adopted the restrictions here in 2013, taking aim at the substances clothianidin, thiamethoxam and imidacloprid.

In addition to banning any use of the chemicals, indoors or outdoors, by nonprofessionals, the e chemicals as fertilizers on barley, millet, oats, rice, rye, sorghum, triticale and wheat.

Between January and June, when those grains are being sown, the regulation bars any use for seed treatment or soil treatment. Another hundred crops including rapeseed,

PRODUCTS REGISTERED IN THE LAST DECADE

PESTICIDE	NEW REPLACEMENTS
Neonicotinoids: Imidacloprid, Thiamethoxam, Acetamiprid, Thiacloprid	**Anthranilic diamides**: Cyantraniliprole Chlorantraniliprole,
	Biopesticides: Emmamectine Benzoate, Prosuler oxymatrine
	Other: Cyromazine, Flupyradifurone
Deltamethrin (G)	**Biopesticides : based on *Beauveria spp* & Azadiractin**

PRODUCTS REGISTERED IN THE LAST DECADE

PESTICIDE CLASS	ACTIVE INGREDIENT
INSECTICIDES	Chlorantraniliprole, Emmamectine Benzoate, Prosular oxymatrine, Cyromazine, Lufenuron, Indoxacarb, Cyantraniliprole, Flupyradifurone, Pymetrozine, Emamectin+lufenuron
FUNGICIDES	Fluoxystrobin, Pyraclostrobin+Dimethomorph
HERBICIDES	Propaquizafop, Dimethenamid-p, Bentazone

THE RISE OF THE BIOPESTICIDES

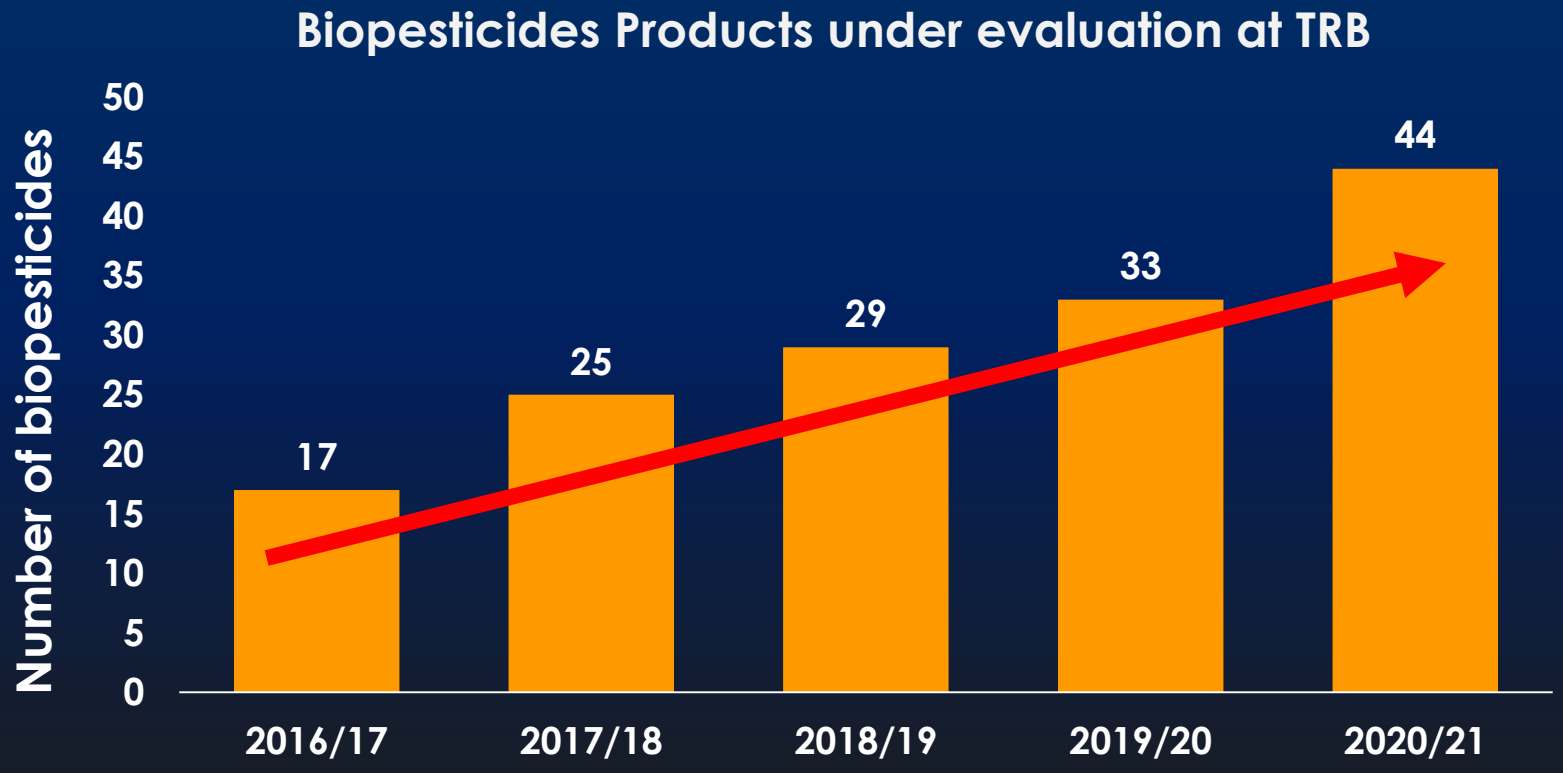
THE RISE OF THE BIOPESTICIDES

Biopesticides

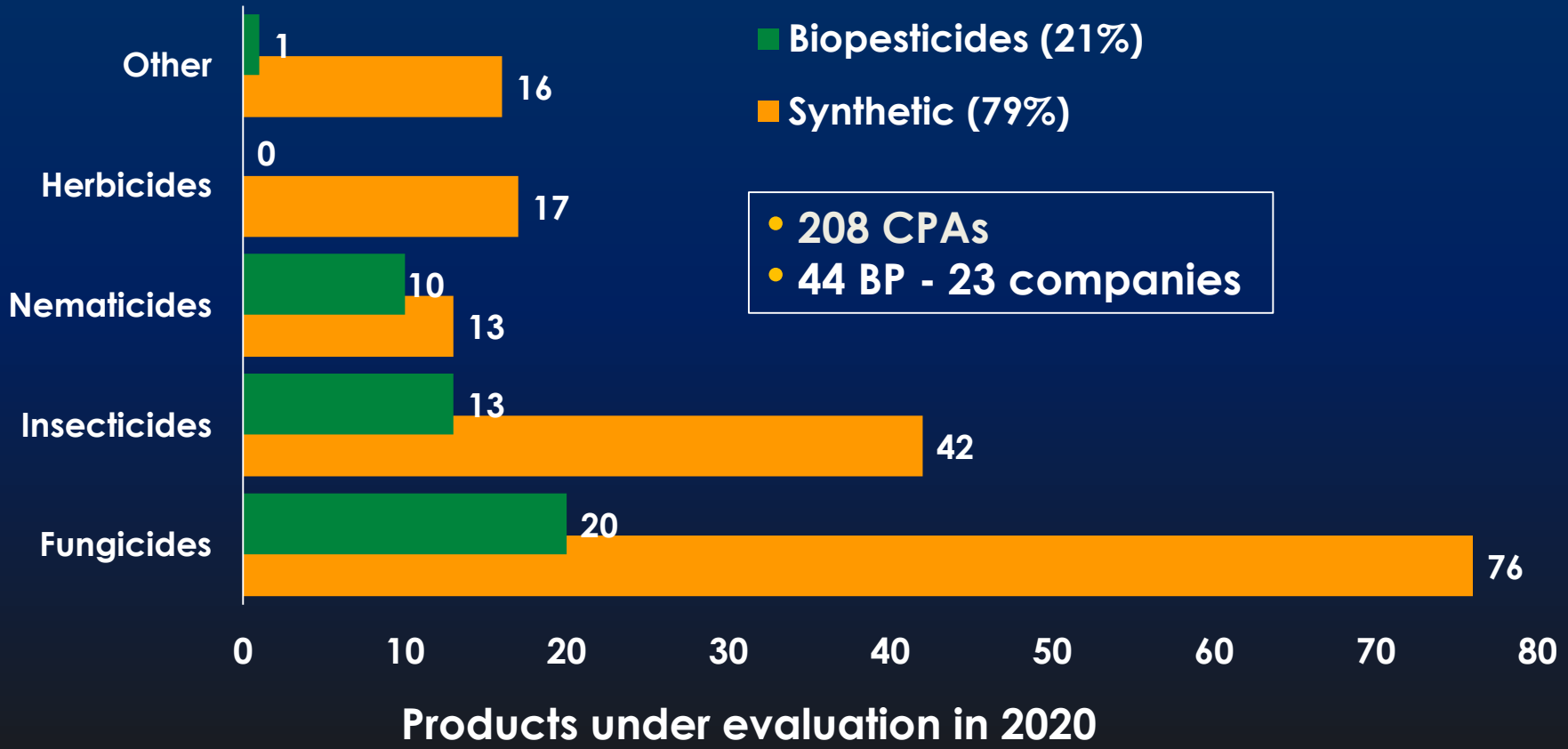
Derived from natural materials eg. Fungi, Bacteria, Plant Extracts, certain minerals etc)

Increase in the No. of biopesticides availed for testing

Trends in Biopesticides submitted for testing



AGROCHEMICALS UNDER EVALUATION - 2020



Some Registered Bio-Pesticides - 2020

	The Biopesticide	Class	Based On
1	**Emamectine Benzoate**	Insecticide	Actinomycete - ***Streptomyces avermitilis***
2	**Prosuler oxymatrine**	Insecticide	*Plant extract* ***Sophora flavescens***
3	***Beauveria bassiana***	Insecticide	Entomopathogenic fungus
4	***Trichoderma harzianum***	Fungicide	Fungus
5	***Bacillus subtilis***	Fungicide	Bacteria

HOWEVER BIOPESTICIDE USE ....

Requires a paradigm shift

- Not broad spectrum, no immediate knock down effect
- Appreciate long-term impacts – not short-term gains
- Used in an **IPM setup – good results**

“You Can’t Win ‘Em All”

BIOPESTICIDES : The ones that got away

	Nature Of Product	Evaluated as a
1	Pelargonic acid- based	Suckercide
2	Harpin protein technology based	Viricide/Plant immune booster
3	*Rheum officinale* base plant extract	Fungicide
4	*Agaricus* based products	Nematicide
5	Mycorrhizae et al based	Fungicide
6	*Bacillus subtilis* based	Nematicide
7	*Allium sativum* based plant extracts	Nematicide
8	*Paecilomyces lilacinus* based	Nematicide

ON HIGHLY HAZARDOUS PESTICIDES (HHPs)

Highly Hazardous Pesticides (HHPs)

- Pesticides known to present **high levels of acute or chronic hazards to health and the environment.**
- Relevant binding International Agreements and Conventions - to **promote awareness of the risks of their use.**

HHPs & Low/Middle Income Countries

- Of major concern in Lower & Middle Income Countries - high incidences of pesticide poisonings
- Inability by most farmers - to meet safety requirements
- Need to **identify and eliminate** these from agro-systems

TRB has actively worked towards their reduction & eventual elimination

WHO Classification Of Pesticide By Hazard

Class		LD_{50} for the rat (mg/kg body weight)			
		Oral		Dermal	
		Solids[a]	Liquids[a]	Solids[a]	Liquids[a]
Ia	Extremely hazardous	5 or less	20 or less	10 or less	40 or less
Ib	Highly hazardous	5 - 50	20 - 200	10-100	40 – 400
II	Moderately hazardous	50 - 500	200 - 2000	100-1000	400 – 4000
III	Slightly hazardous[b]	Over 500	Over 2000	Over 1000	Over 4000[b]

[a] The terms "solids" and "liquids" refer to the physical state of the active ingredient being classified.

[b] See also Part II, Guidelines, para. 7 of Notes, page 7.

Application of the criteria for classification

(a) Where it is shown that for a particular compound the rat is not the most suitable test animal (for example, if another species is conspicuously more sensitive or more closely resembles man in its reaction) then the classification of that compound

HHPs – Extremely Hazardous (Class 1A)

Table 1. Extremely hazardous (Class IA) technical grade active ingredients in pesticides

Common name	CAS no	UN no	Chem type	Phys state	Main use	LD_{50} mg/kg	Remarks
Aldicarb [ISO]	116-06-3	2757	C	S	I-S	0.93	DS 53
Brodifacoum [ISO]	56073-10-0	3027	CO	S	R	0.3	DS 57
Bromadiolone [ISO]	28772-56-7	3027	CO	S	R	1.12	DS 88
Bromethalin [ISO]	63333-35-7	2588		S	R	2	
Calcium cyanide [C]	592-01-8	1575		S	FM	39	Adjus
Captafol [ISO]	2425-06-1			S	F	5000	Adjus 1986
Chlorethoxyfos [ISO]	54593-83-8	3018	OP	L	I	1.8	Extre
Chlormephos [ISO]	24934-91-6	3018	OP	L	I	7	
Chlorophacinone [ISO]	3691-35-8	2588		S	R	3.1	DS 62
Difenacoum [ISO]	56073-07-5	3027	CO	S	R	1.8	EHC
Difethialone [ISO]	104653-34-1	2588		S	R	0.56	EHC
Diphacinone [ISO]	82-66-6	2588		S	R	2.3	EHC
Disulfoton [ISO]	298-04-4	3018	OP	L	I	2.6	DS 68
EPN	2104-64-5	2783	OP	S	I	14	See r
Ethoprophos [ISO]	13194-48-4	3018	OP	L	I-S	D26	DS 79
Flocoumafen	90035-08-8	3027	CO	S	R	0.25	EHC
Hexachlorobenzene [ISO]	118-74-1	2729	OC	S	FST	D10000	Adjus
Mercuric chloride [ISO]	7487-94-7	1624	HG	S	F-S	1	See r
Mevinphos [ISO]	26718-65-0	3018	OP	L	I	D4	DS 14
Parathion [ISO]	56-38-2	3018	OP	L	I	13	See r
Parathion-methyl [ISO]	298-00-0	3018	OP	L	I	14	See r
Phenylmercury acetate [ISO]	62-38-4	1674	HG	S	FST	24	Adjus
Phorate [ISO]	298-02-2	3018	OP	L	I	2	DS 75
Phosphamidon	13171-21-6	3018	OP	L	I	7	See r CAS Nos for E and Z isomers 297-99-4 and 23783-98-4
Sodium fluoroacetate [C]	62-74-8	2629		S	R	0.2	DS 16
Sulfotep [ISO]	3689-24-5	1704	OP	L	I	5	ICSC 985
Tebupirimfos [ISO*]	96182-53-5	3018	OP	L	I	1.3	Extremely hazardous by skin contact (LD_{50} 9.4 mg/kg in rats)
Terbufos [ISO]	13071-79-9	3018	OP	L	I-S	c2	JMPR 1991, 2004

1. Aldicarb
2. Disulfoton
3. Ethoprophos

no longer registered for use on tobacco in Zimbabwe

No Pesticide in 1A registered for use on tobacco in Zimbabwe.

HHPs – Highly Hazardous (Class 1B)

Table 2. Highly hazardous (Class IB) technical grade active

Common name	CAS no	UN no	Chem type	Phys state	Main use	LD_{50} mg/kg	Remarks
Lead arsenate [C]	7784-40-9	1617	AS	S	L	c10	EHC 224; IAR
Mecarbam [ISO]	2595-54-2	3018	OP	Oil	I	36	JMPR 1987a
Mercuric oxide [ISO]	21908-53-2	1641	HG	S	O	18	ICSC 981; CI
Methamidophos [ISO]	10265-92-6	2783	OP	S	I	30	See note 2; H
Methidathion [ISO]	950-37-8	3018	OP	L	I	25	JMPR 1998b
Methiocarb [ISO]	2032-65-7	2757	C	S	I	20	JMPR 1999
Methomyl [ISO]	16752-77-5	2757	C	S	I	17	DS 55; EHC 1
Monocrotophos [ISO]	6923-22-4	2783	OP	S	I	14	See note 2; H
Nicotine [ISO]	54-11-5	1654		L		D50	ICSC 519
Omethoate [ISO]	1113-02-6	3018	OP	L	I	50	JMPR 1997a
Oxamyl [ISO]	23135-22-0	2757	C	S	I	6	DS 54; JMPR
Oxydemeton-methyl [ISO]	301-12-2	3018	OP	L	I	65	JMPR 1990; 2
Paris green [C]	12002-03-8	1585	AS	S	L	22	Copper-arseni
Pentachlorophenol [ISO]	87-86-5	3155		S	I,F,H	D80	See note 2; Irr
Propetamphos [ISO]	31218-83-4	3018	OP	L	I	106	
Sodium arsenite [C]	7784-46-5	1557	AS	S	R	10	EHC 224; IAR
Sodium cyanide [C]	143-33-9	1689		S	R	6	ICSC 1118; C
Strychnine [C]	57-24-9	1692		S	R	16	ICSC 197
Tefluthrin	79538-32-2	3349	PY	S	I-S	c22	See note 9, p.
Thallium sulfate [C]	7446-18-6	1707		S	R	11	DS 10; EHC 1
Thiofanox [ISO]	39196-18-4	2757	C	S	I-S	8	
Thiometon [ISO]	640-15-3	3018	OP	Oil	I	120	DS 67; ICSC 5
Triazophos [ISO]	24017-47-8	3018	OP	L	I	82	JMPR 1994; 2
Vamidothion [ISO]	2275-23-2	3018	OP	L	I	103	JMPR 1989
Warfarin [ISO]	81-81-2	3027	CO	S	R	10	DS 35; EHC 1
Zinc phosphide [C]	1314-84-7	1714		S	R	45	DS 24; EHC 7

1. Methamidophos
2. Methomyl
3. Monocrotophos
4. Demeton-S-methyl

no longer registered for use on tobacco in Zim

Two remaining

5. Oxamyl
6. Fenamiphos

Effective alternatives available

(Fluensulfone & Fluopyram).

Moderately Hazardous (Class II)

Table 3. Moderately hazardous (Class II) technical grade active ingredients in pesticides

Common name	CAS no	UN no	C t
Alanycarb [ISO]	83130-01-2		
Anilofos [ISO]	64249-01-0		
Azaconazole	60207-31-0		
Azocyclotin [ISO]	41083-11-8	2786	
Bendiocarb [ISO]	22781-23-3	2757	
Benfuracarb [ISO]	82560-54-1	2992	
Bensulide [ISO]	741-58-2	2902	
Bifenthrin	82657-04-3	3349	
Bilanafos [ISO]	71048-99-2		
Bioallethrin [C]	584-79-2		
Bromoxynil [ISO]	1689-84-5	2588	
Bromuconazole	116255-48-2		
Bronopol	52-51-7		
Butamifos [ISO]	36335-67-8		
Butylamine [ISO]	13952-84-6	1992	
Carbaryl [ISO]	63-25-2	2757	C S I c300 DS 3, EHC 153, HSG 78, IARC 12, S
Carbosulfan [ISO]	55285-14-8	2992	C I I 250 IMPR 1987a, 2004

1. Pirimicarb
2. Propiconazole
3. Thiodicarb
4. Trichlofon

5. Imidacloprid
6. Thiacloprid
7. Lambda-cyhalothrin
8. Metam Sodium

Effective alternatives available

HAS ZIMBABWE GONE GREENER?

HAS ZIMBABWE GONE GREENER?

- In 1990 - **54%** CPAs in Green/Amber category while Red (22%) & Purple (24%)
- Today **80%** Green/Amber category, 15% Red & only 5% Purple
- None of the extremely hazardous HHPs (Class 1A) are registered for use on tobacco.

HAS ZIMBABWE GONE GREENER?

- Only two highly hazardous pesticides (Class 1B) remain in use but viable alternatives available.
- Increasingly more & more biopesticides - availed for use on tobacco

In this respect, Yes. Zimbabwe has indeed been going greener & greener!

Thank you