PESTICIDES RECOMMENDED FOR USE ON TOBACCO IN MALAWI 2019/20

Aphid infested tobacco

Budworm damaged tobacco

Angular leaf spot diseased

INTRODUCTION

Crop Protection Agents (CPAs) protect crops from yield and quality losses that are caused by insect pests, diseases, weeds and suckers. In a high value crop such as tobacco, it is almost impossible to produce a high yielding and high quality crop without using some CPAs. However, CPAs have a direct cost (chemical and application cost) and indirect cost (human hazard and environmental contamination) and, therefore, need to be used in a judicious manner. The most effective approach to controlling pests involves integrating the use of resistant varieties, cultural practices, mechanical means, as well as CPAs. Integrated pest management (IPM) practices reduce CPAs use, improve profitability and protect the crop and the environment.

This document contains a list of CPAs RECOMMENDED by the Agricultural Research and Extension Trust (ARET) for controlling important insect pests, diseases and weeds of tobacco. The recommendations are based on trials conducted by ARET in collaboration with chemical suppliers. In addition, they are also in line with guidelines issued by CORESTA, the international tobacco research coordinating body. These recommendations take into account the status of CPAs in the major tobacco markets of EU and USA. ARET updates and publishes this list annually.

PESTICIDE FORMULATIONS

CPAs are available in different formulations. The most common formulations used in tobacco are emulsifiable concentrates (EC), suspension powders (SP), wettable powders (WP), granules (G), wettable granules (WG), suspension concentrates (SC), suspension liquids (SL), and oil dispensible (OD).

TOXICITY OF PESTICIDES

All pesticides are classified as poisons; however there are variations in the degree of toxicity. Toxicity refers to the degree to which a pesticide is poisonous to animals and is classified as acute (severe) or chronic (long term); and it varies with species, age, sex and method of entry to animals, nutritional state, and type of pesticide formulation used. Poisoning can occur through the mouth and nose (oral) or through skin contact (dermal). Poisoning through the mouth usually requires less pesticide to kill, although the greatest potential is through skin contact. It is therefore strongly recommended that protective clothing is worn at all times when pesticides are handled. The red label (Tox1) CPAs are prohibited for use on tobacco in Malawi.

A. TOBACCO INSECT PESTS AND CHEMICAL CONTROL

1. APHIDS

Tobacco aphids, also known as the green peach aphid, are the principle pest of tobacco in Malawi. Aphids settle on the tobacco plant, particularly on the underside of leaves, suck plant sap and transmit diseases.

Insecticide name	**Active ingredient**	**Mixture Rate in 10*l* Water**	**Product Rate/Ha**	**Method and timing of application** (*not advisable to apply chemicals after topping to avoid chemical residues)*
Confidor 70 WG	Imidacloprid	1.5 g - nursery	60 g	Drench 2*l* of mixture per m^2 at sowing followed by another drench 45 days after germination
		6.5 g - lands	300 g	Apply 30 m*l* (cup No. 30) of mixture in the transplanting water (*planting hole*) at transplanting.
Acetamark 20 SP	Acetamiprid	3 g - lands	100 – 400 g	Spray starting 2 weeks after transplanting. One to two additional applications could be made based on scouting.
Actara 25 WG	Thiamethoxam	12 g - lands	500 g	Apply 30 m*l* of mixture in the transplanting water (*planting hole*) at transplanting.
Thiamex 25 WG	Thiamethoxam	12.5 g - lands	500 g	Apply 30 m*l* of mixture in the transplanting water (*planting hole*) at transplanting.
Aryna 46 EC	Acetamiprid + Indoxacarb	33.3m*l* - lands	4*l*	Apply the mixture at transplanting as a drench using 30m*l* in the transplanting hole, follow up with spray at 4 weeks later using a knapsack sprayer

2. ANTS

Ants carry away the tobacco seed from the seedbeds and their damage reduce seed germination.

Insecticide	**Active ingredient**	**Mixture Rate in 10*l* Water**	**Product Rate/Ha**	**Method and timing of application** (*not advisable to apply chemicals after topping to avoid chemical residues)*
Decis Forte 10 EC	Deltamethrin	1 m*l* - nursery		Drench 1*l* of mixture per m^2 after sowing followed by fortnightly drenches for four times
Lambda 5EC	Lambda-Cyhalothrin	5 m*l* - nursery		Drench 2*l* of mixture per m^2 at sowing followed by fortnight drenches after seedling emergence for four times.
Belt Expert 480 SC	Flubendiamide 24%+Thiacloprid 24%	1 m*l* - nursery		Drench 2*l* of mixture per m^2 at sowing followed by fortnight drenches after seedling emergence for four times.
		2 m*l* - lands		Foliar application at 2 and 4 weeks after transplanting

3. BUDWORMS

Budworms feed on young tobacco leaves, especially at the bud where they chew the leaves and create holes. The holes are magnified as the leaves grow giving the plants a ragged appearance.

Insecticide	**Active ingredient**	**Mixture Rate in 10*l* Water**	**Product Rate/Ha**	**Method and timing of application** (*not advisable to apply chemicals after topping to avoid chemical residues)*
Belt 480 SC	Flubendiamide	1.3 m*l* – lands	0.3*l*	Spray starting two weeks after transplanting. One or two additional applications could be made based on scouting. Application not recommended after topping to avoid chemical residues
Steward 150 EC	Indoxacarb	7 m*l* - lands	0.3 - 0.6*l*	Spray starting two weeks after transplanting tobacco. Up to a maximum of 2 applications can be made per season based on need.
Prevathon 5 SC	Chlorantraniliprole	Split application of 40 m*l* at planting followed by 14m*l* at 4 weeks after transplanting	2.4*l*	Dilute 40m*l* of Prevathon in 10 liters of water and apply cup No.30 to each planting hole at transplanting. After 4 weeks, dilute 14m*l* of chemical in 10 liters water and spray to the leaves.
Belt Expert 480 SC	Flubendiamide 24%+Thiacloprid 24%	1 m*l* - nursery		Drench 2*l* of mixture per m^2 at sowing followed by fortnight drenches after seedling emergence for four times.
		2 m*l* - lands		Foliar application at 2 and 4 weeks after transplanting
Aryna 46 EC	Acetamiprid + Indoxacarb	33.3m*l* - lands	4*l*	Apply the mixture at transplanting as a drench using 30m*l* in the transplanting hole, follow up with spray at 4 weeks later using a knapsack sprayer

4. CUTWORMS

Brownish – grey soft bodied caterpillars about 2 - 4cm long. Cutworms are more active and prefer feeding at night cutting stems of seedlings at the nursery or newly transplanted seedlings in the lands.

Insecticide	**Active ingredient**	**Mixture Rate in 10*l* Water**	**Product Rate/Ha**	**Method and timing of application** (*not advisable to apply chemicals after topping to avoid chemical residues)*
Lambda EC	Lambda - Cyhalothrin	5 m*l* - nursery	0.5*l*	Drench 2*l* of mixture per m^2 after seedling emergence followed by fortnight drenches for four times.
Decistab	Deltamethrin	2 tablets	30 tablets	Drench 1l of mixture per m^2 after seedling emergence followed by fortnight drenches for four times.
Decis Forte 10 EC	Deltamethrin	1 m*l*		Drench 1*l* of mixture per m^2 after seedling emergence followed by fortnight drenches for four times
Karate 5 EC	Lambda-cyhalothrin	5 m*l* - lands	0.2 - 0.4*l*	If land has prior history of cutworms – apply 30 m*l* of mixture in the transplanting water at transplanting.
Belt Expert 480 SC	Flubendiamide 24%+Thiacloprid 24%	1 m*l* - nursery		Drench 2*l* of mixture per m^2 at sowing followed by fortnight drenches after seedling emergence for four times.
		2 m*l* - lands		Foliar application at 2 and 4 weeks after transplanting

5. GRASSHOPPERS

These include common grasshoppers, green grasshoppers (Bwamnoni) and elegant grasshoppers (**Nunkhadala)**. Grasshoppers are incidental pests and insecticides recommended for control of cutworms and budworms in the seedbeds and lands will also control grasshoppers.

6. STINK BUGS

Stink bugs are green or brown colored insects, shield shaped on the back of wings. Stink bugs cause damage by sucking sap on young leaves. Affected leaves wilt very rapidly, especially during hot days. Spray applications recommended for tobacco aphids control will also control stink bugs.

7. TERMITES

Termites are usually pale-bodied, about 4-6 mm long with brown heads and normally feed on dead organic matter, or on sickly plants, but in some circumstances they may attack growing plants including tobacco. Termites can be a problem both in the nurseries and lands, especially when there is lack of decomposed plant material. Seedlings of young transplants are eaten just at the base of the stems.

Insecticide	**Active ingredient**	**Mixture Rate in 10*l* Water**	**Product Rate/Ha**	**Method and timing of application** (*not advisable to apply chemicals after topping to avoid chemical residues)*
Confidor 70 WG	Imidacloprid	1.5g - nursery	60g	Drench 2*l* of mixture per $m^2$of at sowing followed by another drench 45 days after germination
		6.5g - lands	300g	Apply 30 m*l* of mixture in the transplanting water (*planting hole*) or at base of plant at transplanting only.
Belt Expert 480 SC	Flubendiamide 24%+Thiacloprid 24%	1 m*l* - nursery		Drench 2*l* of mixture per m^2 at sowing followed by fortnight drenches after seedling emergence for four times.
		2 m*l* - lands		Foliar application at 2 and 4 weeks after transplanting
Decistab	Deltamethrin	2 tablets	30 tablets	Drench 1l of mixture per m^2 after seedling emergence followed by fortnight drenches for four times.
Steward 150 EC	Indoxacarb	7 m*l* - lands	0.3 - 0.6*l*	Spray starting two weeks after transplanting tobacco. Up to a maximum of 2 applications can be made per season based on need.

8. WIREWORMS

These are hard-bodied, yellow to brown, shiny, smooth and slender wire like worms living in the soil. Wireworms are common in late ploughed lands with undecomposed plant material. Wireworms feed on seed and newly germinated seedlings in seedbeds and newly transplanted seedlings in the lands.

Insecticide	**Active ingredient**	**Mixture Rate in 10*l* Water**	**Product Rate/Ha**	**Method and timing of application** (*not advisable to apply chemicals after topping to avoid chemical residues)*
Karate 5 EC	Lambda-cyhalothrin	5 m*l* - lands	0.2 - 0.4*l*	If land has prior history of cutworms – apply 30 m*l* of mixture in the transplanting water at transplanting.

9. TOBACCO BEETLE

This is a serious insect pest of stored and cured and stored tobacco. Damage is in form of tunnels in batches of tobacco prominently at the butts. Both the adult and the larvae cause damage to tobacco.

Insecticide	Active ingredient	Mixture Rate	Product Rate/Ha	Application timing and use restrictions
Cislin 2.5 SC	Deltamethrin	12 ml// 10*l* water		Spray 5 *l* of mixture per 100 m^2 to empty tobacco sheds before bringing in new crop
Carifend Net				Cover cured tobacco in storage. Make sure that tobacco is free from any infestation before covering
CHEMICAL UNDER RESTRICTED USE *(This chemical must be applied by registered fumigators only)*				
Phostoxin 56%	Aluminium Phosphide	1.5g/ m^3		Infested tobacco leaf in storage. Keep under airtight sheet for 5-8 days. Thereafter, remove the plastic for aeration

B. TOBACCO DISEASES AND CHEMICAL CONTROL

1. Wildfire, Angular leaf spot, Damping off, Root rot, Algae infection			
Pesticide Trade Name	**Active ingredient**	**Mixture Rate**	**Method and timing of application** (*not advisable to apply chemicals after topping to avoid chemical residues)*
Copper oxychloride 85 WP	Copper oxychloride	300 -500g / 100 litres of water – nursery	Spray 200 -500 ml of mixture per m^2 starting 4 weeks after germination. Spray at weekly interval. Not recommended for field use.
		1 g copper/1*l* pond water -Nursery	Apply at 3 weeks after sowing. Apply in the pond and mix thoroughly. Not recommended for field use.
Sporekill	Didecyl Dimethyl Ammonium chloride	0.25 m*l* of chemical per *l* of pond water-nursery	Apply once 3 weeks after sowing by pouring into the pond water and mixing thoroughly. Used on floating tray system
2. Nematodes			
Basamid Granular	Dazomet 98 GR	50 g/m^2 – nursery	Broadcast and incorporate 50 g/m^2. Ensure complete aeration before sowing and follow label instructions carefully to ensure effective application and fumigation. Basamid controls nematodes, weeds, and soil borne fungi and should be applied before sowing
Velum 500 SC (*Alternative for Vydate*)	Fluopyram	834 m*l* of chemical diluted into 416 liters water	Apply 30 m*l* per planting station at planting (*advisable to integrate Velum with a nematode resistant variety*)
3. Alternaria brown spot, Anthracnose, Frogeye			
Dithane M 45	Mancozeb 80 WP	100-150 g/100*l* water or 2 x cup 5 or 1x cup 16/10*l* water-nursery	Spray 200-500 m*l* of mixture/m^2 depending on size. Start two weeks after germination at fortnight intervals. Start with 200m*l*/m^2 and increase to 500 m*l*/m^2 for full grown seedlings or at first sign of disease.

Kocide 101	Cupric hydroxide 77	150-250 g/100*l* water or 1xcup 16/10 *l* water -nursery	Spray 200 -500 ml of mixture/m^2 depending on size. Start two weeks after germination at fortnight intervals. Start with 200 m*l*/m^2 and increase to 500 ml/m^2 for full grown seedlings or at first sign of disease.
Bion 50 WG	Acibenzolar –S-methyl	12.5 g/10*l* water-nursery 60 g/ha/400*l* water-lands	Apply by spraying at 7 weeks after germination. Repeat after two weeks. Apply at 4 weeks after transplanting. Adhere to application time. Repeat application two weeks later. Do not exceed two applications. Not recommended after 6 weeks
Rovral	Iprodione 25 SC	2*l*/400*l* water/ha-lands	Spray once at 2 weeks after transplanting
Ortiva 250 SC	Azoxystrobin 250 g/*l*	1*l*/400*l* water/ha-lands	Apply by spraying using knapsack sprayer. Spray the plants at 4-5 weeks after transplanting. Repeat the application two weeks later if there are continued wet weather conditions
Cabrio Duo	Pyraclostrobin 3.8% w/w + dimethormorph 6.9% w/w	Dilute 2.5 L of chemical into 300 liters of water	Apply by spraying using knapsack sprayer. Spray the plants at 4-5 weeks after transplanting. Repeat the application two weeks later if there are continued wet weather conditions
4. Soreshin			
Baytan	Triadimenol 15 WP	330 g/100*l* water or 1xcup 30/10*l*-nursery	Drench 2*l* of mixture/m^2 two days before pulling seedlings for transplanting

C. WEED CONTROL

Annual grasses, Some broad leaf, Yellow nut sedge			
Trade Name	**Active ingredient**	**Mixture Rate**	**Method and timing of application**
Focus Ultra	Cycloxyidimm ethyloleate	1.2*l*/ha or 80m*l*/15*l* sprayer to 500m ridge –lands	Post-emergence herbicide – apply 200-400*l* of mixture/ha or 1x 15*l* sprayer to 500m ridge.
Trif	Trifulalin	1.2-1.6*l*/ha or 80-105 ml/15*l* sprayer	Pre-emergent – apply 200-400*l*/ha. Spray and incorporate with a light disking ridging should follow. Or spray after ridging and incorporate 10-15 cm deep before holing out
Dual Magnum 960 EC	S Metolachlor	1.5*l*/ha or 100ml/15*l* knapsack sprayer-lands	Apply 200-400*l* of mixture/ha or 1x15*l* sprayer to 500 m ridge. Apply pre-planting before holing out or as an overall spray within three days of transplanting
Pree	Metazachlor	0 20% clay, 1.0*l*/ha; 20% + 1.2*l*/ha-lands	Pre-emergent application. On dry land crops metazachlor must not be used soils of less than 20% clay
Command 4 EC	Clomazone	1.5*l*-1.75/ha or 100m*l*-110-m*l*/ 15*l* sprayer –lands	Apply 200-400*l* of mixture/ha or 1x 15*l* sprayer to 500m ridge. Ideally as an overall spray after transplanting. Application can take place up to four weeks. Do not spray later than four weeks after planting

D. SUCKERCONTROL

Trade Name	Active ingredient	Mixture Rate	Method and timing of application
Antak	N-decanol	1 part of suckercide to 25 parts of water-lands	Apply 1xcup 8 to tobacco topped between 18-20 leaves or cup 16 to tobacco topped at 20 leaves and above. Topping and suckercide application should take place in the same operation for best results. Do not apply to wet crops.
Fair 85	N-decanol/Octanol	1 part suckercide to 25 parts water-Lands	Apply 1 x cup 8 to tobacco topped between 18-20 leaves or cup 16 to tobacco topped at 20 leaves and above. Topping and suckercide application should take place in the same operation for best results. Do not apply to wet crops.
Tabamex 360 EC	Butralin	1.5l/100l water or 150ml/ 10l/ water-lands	Apply 1 x cup 8 to tobacco topped between 18-20 leaves or cup 16 to tobacco topped at 20 leaves and above. Topping and suckercide application should take place in the same operation for best results.
Yamaotea Super 305 EC	Flumetralin, 125 g/*l* + Butralin, 180 g/*l*	1 part of suckercide to 120 parts of water or 80m*l* in 10 liters water	Apply 1 x cup 16 to the topped plant. Topping and suckercide application should take place in the same operation for best results. The chemical will be effective if no rain falls for two hours after application
Fabulin Forte 305 EC	Flumetralin, 125 g/*l* + Butralin, 180 g/*l*	1 part of suckercide to 120 parts of water or 80 m*l* in 10 liters water	Apply 1 x cup 16 to the topped plant. Topping and suckercide application should take place in the same operation for best results. The chemical will be effective if no rain falls for two hours after application
Tobularin Super	Flumetralin, 125 g/*l* + Butralin, 180 g/*l*	1 part of suckercide to 120 parts of water or 80 m*l* in 10 liters water	Apply 1 x cup 16 to the topped plant. Topping and suckercide application should take place in the same operation for best results. The chemical will be effective if no rain falls for two hours after application

PROHIBITED AGROCHEMICALS IN TOBACCO		
TRADE NAME	**ACTIVE SUBSTANCE**	**REMARK**
Chlordane	Chlorodane	The destination of our tobacco will not accept tobacco with detection of any of the listed prohibited CPAs
Nenagon	Dibromochloropropane	
Compound B	Dicamba	
Methyl Bromide	Methyl Bromide	
J-38, Athio	Formothion	
Sanocide, HCB	Hexachlorobenzene	
DMDT, Marlate	Methoxychlor	
Lannate	Methomyl	
Toxaphene	Camphechlor	
2,4-D	2,4-D	
2,4,5-T	2,4,5-T	
Aldrine	Aldrin	
Antex	Dieldrin	
Ambush	Permithrin	
DDT	DDT	
TDE	TDE	
Heptagran	Heptachlor	
Penite	Arsenicals	
BHC	Hexachlor (BHC)	
Azodrin	Monocrotophos	
Dysyston	Disulfoton	
Metaxysttox	Demeton-S-Methyl	
Dipterex	Trichlorfon	
Temik	Aanacarb	
Benlate	Benomyl	
Benodanil	2-idobenzanilide	
Ridomil	Metalaxyl	
Zineb	Zinc enthylene	
Accotab	Pendimenthalin	
Fusillade	Fluazifop-P-Butyl	
Planavin	Nitralin	
Tilam	Pebulate	
Orthene	Acephate	
Vydate	Oxamyl	
Tamaron	Methamidophos	
Actellic	Pirimiphos methyl	
Thunder 145 OD	Imidacloprid+Beta-cyfluthrin	
Dursban 480 EC	Chloropyriphos	
Ripcord 20 EC	Cypermethrin	
Rogor 40 EC	Dimethoate	
Herbifume	Metham Sodium	
Bulldock 0.05GR	Beta-cyfluthrin	
EDB	Ethylene dibromide 92	
Nativo 300 SC	Tebuconazole + triffloxystrobin	

WARNING

- Use of prohibited pesticides should be avoided as it will result in non-compliance with customer requirements and country of destination regulations
- Growers must comply with the specific recommended use, mixture rates, application methods and pre-harvest/withholding periods which are indicated on the pesticides labels.
- Late and heavy application of chemical to leaf must be avoided as this may result in unacceptably high residual levels.
- It is recommended to wear protective clothing (gumboots, overalls, face masks and gloves) at all times when handling pesticides
- Avoid applying chemicals on windy days, when it's raining or during hot conditions

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Farmers are urged to take advantage of the services offered by ARET so that tobacco productivity, quality and profits are increased. ARET is there for you, our dear farmers and other stakeholders, and the services are just a call away