

PESTICIDE RECOMMENDATIONS

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Department of Agriculture, Peradeniya
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PREFACE

The Department of Agriculture has been publishing updated Manuals on Pesticide Recommendations since 1977 for the use of research scientists, extension specialists and technical staff in private sectors involved in pest, disease and weed management in agriculture crops. The latest revised edition was published in 2015.

This manual is an outcome of extensive research in evaluating bio-efficacy of new pesticide formulations imported for testing under local conditions in the country. Apart from pesticides recommended for food crops, for the first time, the research scientists have taken steps to include recommended pesticides for plantation crops, including tea, rubber, coconut and sugarcane to provide a wider scope for information need community.

The introductory chapter of this manual provides important information on the procedures adopted in selecting the best products for target organisms, the best application method recommended for desired results and an outline of the expectations from farmers in helping minimize resistance development in pests to pesticides, one of the major concern in recommending pesticides world over.

The pesticide recommendations have been categorized according to crops/pest combinations for easy reference. In addition, the Mode of Action of pesticides are given for the farmers to select the best options to minimize resistance development in pests, pathogens and weeds to pesticides by selecting different pesticide with a different Mode of Action in case the he/she decide for a repeated application to manage a difficult to control pest/disease and weed.

The expectations, are that the extension scientists would transmit the correct information on dose, dilution, pre harvest intervals and safe application procedure to the growers to help minimize waste, environment contamination and achieve desired goals.

It is with great pleasure, I appreciate the Officers in the office of the Registrar of Pesticides, Plant Protection Service and research institutes in the DOA and other crop related institutes for the untiring efforts given to make this valuable manual a useful document for the development of agriculture sector in Sri Lanka.

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PROCEDURES AND GUIDELINES IN PESTICIDE USAGE

INTRODUCTION

Since gaining independence in 1948, all successive governments have given the highest priority to increase the food production in the country to reach the cherished goal of self-sufficiency in food. Introduction of modern high yielding crop cultivars accompanied with the adoption of improved crop production and crop protection practices such as chemical fertilizers, pesticides, increased cultivated extent improved irrigation facilities and increased cropping intensities have significantly contributed to a steady increase of food production over the last several decades in the country.

However, adoption of modern agricultural practices supported a favorable climate for a rapid growth of pests, disease-causing pathogens and weeds in agricultural fields. Besides, high yielding modern crop varieties with relatively narrow genetic base are inherently more vulnerable to pests, diseases and weed infestations. The results have been a heavy dependence on synthetic pesticides for the control of these organisms. Thus, pesticides have become a critically important component in modernization of agriculture in the country.

Despite many advantages, there are some potential hazards and risks associated with pesticide use. In many developing countries like ours, very often small farmers are not competent enough to use highly toxic pesticides safely while protecting their health and quality of the environment. Non optimal and non-judicious use of pesticides may lead to the development of resistance in pests to pesticides in the long run and certain externalities like environmental pollution and health hazards. However, pesticides can be used safely and effectively without these undesirable effects if proper guidelines are followed. Hence, it is advised to farmers to avoid misuses (use of pesticides for purposes that are not intended for), abuses (improper use/ use in a wrong manner away from the normal usage) and overuses (use too much) of pesticides to protect human health and environmental quality.

Conventional use of pesticides tends to ignore the causal factors related to pest problems and instead to rely on routine, scheduled calendar-based (prophylactic) applications. Very often pesticides are applied immediately after observation of a pest, disease or weed without considering damage thresholds. Pesticides are often temporary fixes and ineffective over the long-term use. Prophylactic chemical pest control has been associated with destruction of other beneficial species viz. parasitoids, predators, pollinators, resurgence of the targeted pest populations, outbreaks of minor pests, residues in food, feed and the environment and debilitating farmer's health from prolonged exposure to pesticides. All these undesirable effects of pesticide use can be effectively minimized through adoption of Integrated Pest Management (IPM) techniques which are based on the balancing forces in ecological system.

Integrated Pest Management (IPM) in a global perspective involves the adoption of a combination of various pest control techniques in a compatible manner to maintain the pest populations below an economic threshold level with minimum reliance on low-toxic pesticides as an ultimate option. Adoption of IPM in various cropping situations in many countries across the world, including Sri Lanka has been quite effective and contributed significantly to reduce the heavy use of pesticides.

This text is a set of guidelines to help agriculture extension specialists to empower the farming community on the correct usage of pesticides for crop protection

ADOPTION OF PESTICIDES

According to the FAO definition, “pesticide is any substance or mixture of substances intended for preventing, destroying, repelling or mitigation of any pest including vectors of human and animal diseases, unwanted species of plants or animals causing harm or otherwise interfering with the production, processing, storage, transport or marketing of food, agriculture commodities and wood/ wood products. The term includes substances intended for use as a plant growth regulator, desiccant or agent of thinning and substances applied to crops after harvest (fumigants) to protect the commodity from deterioration during storage and transport”.

Pesticides play an indispensable role in our day to day life style. Major benefits of pesticides and their role in food production, human and animal health and environment include:

1. Increasing food quality and quantity through control of undesirable pests, disease causing organisms and weeds in agricultural and plantation crops and stored products.
2. Decreasing food prices since use of pesticides improve crop yields and minimize cost of production per unit harvest
3. Controlling vectors of disease causing organisms in human and domesticated animals
4. Protection of environment through control of house hold pests and noxious weed management in roadsides, recreation areas, industry sites, irrigation canals and aquatic habitats.

Despite these positive advantages of pesticides to improve the quality of human life, they can cause health and environmental problems, residues in food including contamination of environment (air, water, soil). All these negative impacts of pesticides have been due to misuse of pesticides. Internationally big effort is made in a broader sense, to promote safe use of chemicals including pesticides, which are reflected in Chapter 19 of Agenda 21 (Earth Summit). This identifies the elements for the sound management of the chemicals through adequate legislation, information gathering and dissemination, capacity for risk assessment, establishment of risk policy and capacity for implementation and enforcement including effective education programs. Also legally binding instruments like Rotterdam Convention, Basle Convention and Vienna Convention are important in harmonizing the pesticide regulation activities among different parties across the international community. All these conventions have been ratified by Sri Lankan government.

All pesticides in the Island are coming under the regulations of Control of Pesticides Act No. 33 of 1980 and Control of Pesticides (Amendment) Act No. 6 of 1994. According to the Regulations made there under - Parliament deems it expedient in the public interest for the Government to control pesticides including the import, packing, labeling, storage, formulation, transport, sale and use thereof

As deemed by the regulations of the Pesticide Act all pesticides intended to be used in the country become compulsory to register to ensure that pesticides are effective for the purpose of pest control and will not subject the user, consumer or treated foods and the natural environment to unacceptable risk. The ultimate goal of registration is to provide the community with adequate protection from the adverse effects not denying access to benefits from the use of pesticides. All pesticides used in the country are imported as either finished products or technical material by the private sector. Technical material is later formulated into finished products by local companies in their formulation factories. These activities are also coming under regular inspection of the Registrar of Pesticides.

PESTICIDE REGISTRATION

Pesticide registration procedure follows a step-wise orderly process based upon a set of organized evaluation criteria that include:

1. Pre-registration evaluation: National policies as deemed by the requirements of the international treaties and conventions for which Sri Lanka has become signatory, FAO and WHO guidelines relevant to highly risky, hazardous chemical on human health, environment and food, and available alternatives.
2. Bio-efficacy testing on suitability under local environment: laboratory and field scale testing and evaluation at research and field level based upon local standards as decided by the research organizations in the Dept. Agriculture, Plantation sector (tea, rubber, coconut, and sugar) and Dept. of Export Agriculture
3. Evaluation of pesticide dossiers: risk/benefit analysis with respect to chemical, toxicological and environmental effects.
- 4.1 Registration of the product and issue of license valid only for 3 years: A product is registered once all the previous steps in the registration process are successfully completed. The product will be registered under one of the categories as general, restricted or domestic.
- 4.2 Registration of the product and issue of provisional permit – pending verification of minor issues
5. Re-registration of the product and issue of provisional permit: Three years after a product has been registered for marketing, the registrants are requested to follow a re-registration procedure to extend its marketing rights for another period of 3 years. The formulation has to be re-evaluated for its efficacy on target pests. In addition, the formulation will be evaluated on the basis of benefits and risks using the latest technical data/information available at local and global level.

Failing to meet the requirements at any stage of the registration procedure would result in rejecting the pesticide from registration process.

In the interest of the public as guided by the Pesticide Technical Advisory Committee (PeTAC), Registrar of Pesticides takes necessary actions to cancel, suspend or modify the conditions of registration given on a pesticide. As result of continuous monitoring and latest technical data available at local and global level, several registered pesticides have been withdrawn from pesticide recommendation.

Based upon the availability to consumers, toxicity of the chemical and the intended use, pesticides are classified into three main groups:

1. General pesticides -
All agricultural pesticides
Can be sold only in authorized sales outlets (Pesticide Act No. 6, 1994)

2. Restricted pesticides -
 - Highly hazardous chemicals
 - Not available in the retail market
 - Distribution is restricted
 - Require trained applicators under strict supervision

3. Domestic pesticides -
 - Can be sold without a license
 - Pesticides are of low strength
 - Less hazardous on health and environment

PESTICIDE APPLICATION IN FIELD CROPS

Precise application of a specific rate of pesticide becomes a deciding factor for effective and economical control of pests. Usually water is used as a carrier to apply pesticides and the spray volume required for a given area of a crop is a function of several factors including the type of sprayer, (knapsack vs. power), walking speed of the applicator, nozzle type, canopy size of the crop etc. A lethal dose of the pesticide should reach the target organism for effective control of the pest and this is guaranteed through application of the correct dilution rate. Thus prominence has given to the spray volume while calculating the amount of total pesticide that is required to apply on a given crop. Since the spray volume for a crop may vary with the developing canopy size, three basic canopy sizes have been identified as low canopy, medium canopy and high canopy. Approximate spray volumes per hectare required to apply with a knap sprayer for these different canopy sizes have been developed to determine the rate of application per ha, keeping the dilution rate of the spray mixture more or less fixed. It is important to note that all crops do not encompass all three canopy stages during their crop growth cycle. Dilution rate for Power sprayers should be calculated accordingly as volume per unit area is lesser than knapsack sprayers due to more atomization.

Canopy size of the crops and required spray volume l/ha (No. of 16 - litre tanks)

Stage I: low canopy	320 - 400 l/ha (20 - 25)
Stage II: medium canopy	500 - 640 l/ha (30 - 35)
Stage III: high canopy	700 - 800 l/ha (40 - 50)

*Tank capacity is considered as 16 liters

Total spray volume needed for fungicides and insecticides may vary according to the canopy size of a given crop. Unlike fungicides and insecticides which may be applied at different canopy stages, herbicides are usually applied either before weed emergence or at early stage of crop growth (low canopy stage). Thus the total spray volume becomes mostly be around 320 - 400 l/ha. Further, lower dosage is recommended when weeds are at young stage while the higher dose, when weeds are little matured. On the other hand under non crop situations where extensive foliage is encountered, it is appropriate to apply an adequate volume of the spray mixture to entirely wet the total canopy of the standing weed biomass.

NOZZLE CHOICE FOR PESTICIDE APPLICATION

The proper selection of a nozzle type is essential for effective pesticides. A nozzle is an atomizing device that breaks the liquid into droplets, form the spray pattern, and propel the droplets in the proper direction. Nozzles determine the amount of spray volume at a given operating pressure, the amount of spray applied to an area, the uniformity of application, the coverage obtained on the target surface and the amount of potential drift. Drift can be minimized by selecting nozzles that produce the largest droplet size while providing adequate coverage at the intended application rate and pressure. Minimizing drift is especially important for herbicides. Nozzles are classified according to the spray pattern they emit and the commonly used nozzle types in low-pressure agricultural sprayers include flat-fan, flood jet, hollow-cone and full-cone nozzles. Using the correct nozzle enables safer and more effective spraying.

Flat fan nozzle

The spray droplets emerge in a fan shape on leaving the nozzle orifice. The spray pattern “tapers” at the edges. The standard flat-fan nozzle normally operates between 30 and 60 pounds per square inch (psi), with an ideal range between 30 and 40 psi. The flat fan nozzle delivers droplets in small to medium range at 30-40 psi pressure. Commonly used flat fan nozzles have a 65, 80 or 110 spray angle at 40 psi pressure. This nozzle is best suited for broadcast spraying of herbicides.

Flood fan or flood jet nozzle

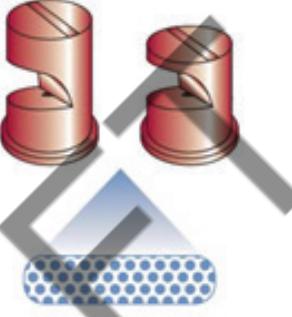
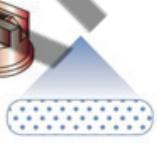
The spray pattern of the flood fan nozzle is similar to the flat fan nozzle, but has a much wider angle from 115 to 147, depending on the nozzle size. These nozzles produce relatively larger droplets at pressures of 10 to 25 psi and reduce spray drift problems. Usually, flood nozzles are commonly used to apply soil incorporated and pre-emergent herbicides. Flood nozzles are popular for applying suspension fertilizers where clogging is a potential problem

Hollow Cone and Solid Cone Nozzles

These two types of nozzles deliver circular spray patterns. The hollow cone nozzle delivers a few liquid droplets to the center leaving majority of the droplets distributed along the peripheral area of the circular spray pattern. The solid cone nozzle delivers liquid droplets uniformly to the entire circle. Hollow - cone nozzles are generally used to apply insecticides or fungicides to field crops when foliage penetration and complete coverage of the leaf surface is required. These nozzles operate in a pressure range from 40 to 100 psi. Spray drift potential is higher from hollow-cone nozzles than from other nozzles due to the small droplets produced. Generally, this type of nozzle should not be used to apply herbicides.

The wide-angle, solid-cone nozzles are a good choice if drift is a concern because they produce larger droplets than flood nozzles. Usually full-cone nozzles are recommended over flood nozzles for soil-incorporated herbicides. Full-cone nozzles operate between a pressure range of 15 to 40 psi.

NOZZLE CHOICE FOR APPLICATION OF PESTICIDES

Type of Pesticide	Type of Nozzle	Nozzle and Spray Pattern	Approximate Pressure (Bars)
Insecticides and Fungicides	Hollow cone nozzle		1-3
	Solid cone nozzle		1-2
Herbicides	Flood-jet nozzle		1-2
	Flat fan nozzle		1-2

PESTICIDE APPLICATION IN PROTECTED HOUSES

In general, extra care and attention are required in pesticide application in crops grown in protected houses. The risk of pesticide exposure to the applicator is extremely high in protected houses; therefore, it is advisable to select the low toxic pesticides and safety measures need to be followed (i.e. insecticides in MOA groups 7, 15, 17 and 18 and those with a Green or Blue color band bottles preferred over those with Yellow bands).

In protected houses the environmental conditions and biotic factors are highly conducive for rapid multiplication of insect, mites and pathogens. As such best approach would be to initiate control measures at the early sign of pest or disease incidence. Granular pesticides need to be preferred over the liquid formulations. In general EW, SL, SC, WP, WG formulations are considered safer than EC formulations.

The techniques like chemigation and fertigation need yet to be developed. It is encouraged to explore possibilities of using bio-control agents for the management of pests in protected houses.

SAFER AND EFFECTIVE APPLICATION OF PESTICIDES

Pesticides are also hazardous to humans, non-target animals and the environment. For these reasons, it is extremely important to know how to apply pesticides safely. Proper application is not only safer, but also more effective. The correct calibration of spraying equipment is the key to safe, effective and cost-efficient pesticide use. Correct calibration means you are applying the right amount of chemical at the right concentration. Over-application of pesticides can cause off-target damage and pollute the environment including the ground water resources. Make sure you use these chemicals correctly and according to the label's directions.

1. Read the label carefully before application of pesticides: The label contains information on:
 - Specific purpose of the pesticide,
 - Level of toxicity with “caution” being the least toxic and “danger” the most toxic.
 - Pesticide safety information.
 - Protective clothing and equipment needed for pesticide application.
 - General instructions for pesticide use, storage and disposal.
2. Strictly follow the recommendations given on pesticides.
3. Apply pesticides based on the economic thresh hold levels, but not on prophylactic basis
4. Select the least toxic and least persistent pesticides
5. Select the correct nozzle type and a trouble free recommended knapsack sprayer.
6. Choose the best day and time of day for safety in pesticide application.
7. Avoid breezy days to minimize the pesticide drift.
8. Never apply herbicides when it is windy and stop if the wind picks up.
9. Mornings and evenings are usually better times of the day for pesticide application.
10. Estimate the total spray volume required to apply for the extent of the crop / intended application area
11. Dilute the pesticide with exact dilution rate according to the label instructions
12. Wear protective clothing and other personal protection items

13. Apply on to the target area with the minimum amount of pesticides required
14. Do not use pesticides of the same mode of action continuously
15. If available, prefer mixed formulations with different mode of action
16. Adhere strictly to the pre harvest intervals
17. Clean up after pesticide application. Rinse spray equipment and flush hoses and nozzles. Remove clothing before washing face, hands and body. Wash yourself, clothing and protective equipment.
18. Store pesticides in original containers in a locked cabinet away from temperature extremes and away from children and pets.
19. Buy only the amount of pesticide required to avoid having to dispose unused pesticide.
20. Disposal of expired products and empty cans should be done according to the standard methods and avoid toxic hazards to the environment

PESTICIDE SAFETY

Pesticides are potentially hazardous chemicals when fail to use judiciously. Spray operators should be aware of the toxic nature of pesticides not only for pests and disease causing organisms including weeds, but also on beneficial organisms and human health. Most of this information is available in the pesticide label. As spraying can be on open crop fields, orchards, non-crop areas and green houses, exposure of the spray operator on pesticide drift could vary according to the situation. Determine in advance the parts of the body that is most liable to be exposed to and adopt appropriate personal protective equipment and clothing while mixing and application of pesticides. Smoking and eating should be totally avoided while handling pesticides.

Pesticide applicators are encouraged to consider the Color band of the label and MOA groups of the selected pesticide. The order of preference of pesticides using the color band should be Green (more preferred) > Blue > Yellow. In Mode of Action Grouping, give preference to pest- specific pesticides over the general pesticides. For example prefer Insect Growth Regulators over the neuro-toxic compounds.

(You are requested to refer the Manual for safe and effective use of pesticides published by the DOA for further details) remove?

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INSECTICIDES

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Department of Agriculture
Peradeniya
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Crop/Pest	Common name, Formulation Type & Strength	MOA	Dilution (ml or g per 16L)	Rate of Application (Product ml or g/ ha)		PHI Days	Remarks
				Low foliage	High foliage		
01. CROP: RICE							
Rice Thrips <i>Stenchaetothrips biformis</i>	For seed treatment: Thiamethoxam 70% WS Imidacloprid 70% WS	4 4		20 g/500 ml water/100 kg seed 20 g/500 ml water/100 kg seed			In endemic areas and in late planted crops it is strongly advisable to treat the soaked seeds with insecticide powder dissolved in water before incubation. Wear gloves during handling chemicals and broadcasting seeds.
	For foliar application: Buprofezin 250 g/l SC Pymetrozine 50% WG Imidacloprid 200 g/l SL Imidacloprid 70% WG Thiacloprid 240 g/l SC Ethiprole 100 g/l SC Fipronil 50 g/l SC Carbosulfan 200 g/l SC	16 9 4 4 4 2 2 1	32 ml 10 g 8 ml 2.5 g 5 ml 16 ml 8 ml 32 ml	640 ml 200 g 160 ml 50 g 100 ml 320 ml 160 ml 640 ml	- - - - - - - -	14 14 14 14 14 14 14 14	Apply foliar sprays when 50% of leaves/hill show damage symptoms.
Rice gall midge <i>Orseolia oryzae</i>	Fipronil 0.3% GR	2	-	12 kg		14	When damage symptoms appear, it is too late for effective control. In endemic areas, as regular practice treat nurseries 5 days after seeding 12 g Fipronil/10 m ² . Broadcast granules on wet mud or into 1 cm of standing water 1 - 2 weeks after transplanting or 1 - 3 weeks after broadcasting (ETL - 5% Galls)
Rice leaf folder <i>Cnaphalocrosis medinalis</i> <i>Marasmia patnalis</i>	Flubendiamide 24% WG Flubendiamide 20% WG Chlorantraniliprole 20% + Thiamethoxam 20% WG	28 28 28 + 4	2.5 g 3 g 5 g	50 g 60 g 100 g 125 g	60 g 75 g 125 g 800 ml	07 07 10 14	Apply insecticides when 25% of the leaves show more than 50% leaf damage or 10 live larvae (in rolled leaves) in 10 randomly selected hills.
Case worm <i>Nymphula depunctalis</i>	Tebufenozide 200 g/l SC Methoxyfenozide 240 g/l SC Azadirachtin 10 g/l EC Chromafenozide 50 g/l SC Chlorfluazuron 50 g/l EC Novaluron 100 g/I EC Bistrifluron 100 g/l EC Spinetoram 25% WG Fipronil 50 g/l SC	18 18 UN 18 15 15 15 5 2	32 ml 16 ml 80 ml 16 ml 13 ml 16 ml 24 ml 5 g 20 ml	640 ml 320 ml 1600 ml 320 ml 260 ml 320 ml 480 ml 100 g 380 ml	800 ml 400 ml 2000 ml 400 ml 325 ml 400 ml 600 ml 125 g 480 ml	10 10 07 10 10 14 07 07 14	

Pesticide Recommendations

Insecticides

Crop/Pest	Common name, Formulation Type & Strength	MOA	Dilution (ml or g per 16L)	Rate of Application (Product ml or g/ ha)		PHI Days	Remarks
				Low foliage	High foliage		
Rice Stem borer <i>Scirpophaga incertulas</i>	Chlorantraniliprole 20% +	28 +					Apply insecticides only when damage exceeds 10% dead hearts or 5% white heads.
	Thiamethoxam 20% WG	4	6 g	125 g	150 g	10	
	Fipronil 0.3% GR	2	-	12 kg		14	
	Carbosulfan 200 g/l SC	1	48 ml	960 ml	1200 ml	14	
	Thiocyclam 4% GR	14		12 kg/ha		14	
Rice Brown Plant-hopper <i>Nilaparvata lugens</i>	Buprofezin 10% WP	16	10 g	200 g	240 g	14	Apply insecticides only when number of BPH (nymphs+ Adults) exceeds 5 /hill at tillering and 8/ hill at reproductive stage. When sprays are used direct to the base of the plant.
	Buprofezin 250 g/l SC	16	16 ml	320 ml	400 ml	14	
	Thiocyclam (Hydrogen Oxalate) 50% SP	14	40 g	800 g	1000 g	14	
	Pymetrozine 50% WG	9	12.5 g	250 g	310 g	07	
	Chlorantraniliprole 20% +	28 +					
	Thiamethoxam 20% WG	4	5 g	100 g	125 g	10	
	Imidacloprid 70% WG	4	2.5 g	50 g	60 g	14	
	Imidacloprid 200 g/l SL	4	8 ml	160 ml	200 ml	14	
	Thiamethoxam 25% WG	4	5 g	96 g	120 g	14	
	Sulfoxaflor 50% WG	4	6 g	120 g	150 g	07	
	Etofenprox 100 g/l EC	3	24 ml	480 ml	600 ml	07	
	Ethiprole 100 g/l SC	2	24 ml	480 ml	600 ml	14	
	Fenobucarb 500 g/l EC	1	56 ml	1120 ml	1400 ml	14	
	Carbosulfan 200 g/l SC	1	40 ml	800 ml	1000 ml	14	
	Thiocyclam (Hydrogen Oxalate) 4% GR	14		25 kg		14	
	Acetamiprid 20% SP	4	16 g	320 g	400 g	14	
Paddy bug <i>Leptocorispa oratorius</i>	Thiocyclam (Hydrogen Oxalate) 50% SP	14	40 g		800 g	14	Apply pesticides when the bug density is 1 per 10 hills. Follow the same recommendation for pentatomid bug (Paddy bug infestation is confined to canopy stage only).
	Sulfoxaflor 50% WG	4	6 g		120 g	07	
	Ethiprole 100 g/l SC	2	32 ml		800 ml	14	
	Carbosulfan 200 g/l SC	1	64 ml		1280 ml	14	
Field crab <i>Paratelphusa ceylonensis</i>	Fenobucarb 500 g/l EC	1	Mix 3 ml of insecticide in 1 l of water				Squirt insecticide solution into crab burrows after removing the swirl plate from the nozzle.
Leaf mites <i>Hemitarsonemus spp.</i> <i>Oligonychus spp.</i> <i>Tetranychus spp.</i>	Hexythiazox 50 g/l EC	10	24 ml	480 ml	600 ml	14	
	Sulphur 80% WP/WG	UN	128 g	2500 g	3200 g	14	
Sheath mite <i>Steneotarsonemus spinki</i>	Fenpyroximate 50 g/l EC	21	14 ml	-	350 ml	14	Spray at the late booting stage of the crop. Do not apply insecticides after panicle emergence
	Hexythiazox 50 g/l EC	10	36 ml	-	900 ml	14	

Insecticides

Pesticide Recommendations

Crop/Pest	Common name, Formulation Type & Strength	MOA	Dilution (ml or g per 16L)	Rate of Application (Product ml or g/ ha)	PHI Days	Remarks	
				Low foliage High foliage			
Rats <i>Ratus</i> spp. <i>Bandicoota</i> spp.	Difenacoum 0.005% RB Brodifacoum 0.005% RB					Start baiting soon after transplanting and continue up to grain maturity. Place the bait inside a piece of bamboo about 1 foot long (40 baiting stations/ha).	
VEGETABLES							
02. CROP: BEANS							
Bean fly <i>Ophiomyia phaseoli</i>	Seed Treatment: Thiamethoxam 70% WS	4		1.5 g/kg seed		Mix 1.5 g of Thiamethoxam 70% WS in 8-10 ml of water & mix with the seeds, & keep for about 24 hours before planting. Wear gloves when handling chemicals & planting treated seeds.	
	Carbosulfan 200 g/l SC	1	48 ml	960 ml 1800 ml	14	Apply at 7 days after planting or when first pair of leaves appear & repeat after 2 weeks if necessary. Repeat application at flowering if infestation is severe.	
Bean pod borer <i>Maruca vitrata</i> <i>Helicoverpa armigera</i> <i>Lampides boeticus</i>	Etofenprox 100 g/l EC Novaluron 100 g/l EC Chlorfluazuron 50 g/l EC Flubendiamide 24% WG Chlorantraniliprole 200 g/l SC Chlorantraniliprole 20% + Thiamethoxam 20% WG	3 15 15 28 28 28+ 4	24 ml 16 ml 16 ml 5 g 5 ml 5 ml 2.5 g	480 ml 320 ml 320 ml 100 g 100 ml 180 ml 50 g	900 ml 600 ml 600 ml 190 g 180 ml 125 g	07 14 10 05 03 14	Start spraying at flowering and repeat at 10-14 days intervals if necessary. Three sprayings may be necessary for pulses.
03. CROP : CABBAGE							
Leaf eating caterpillars <i>Spodoptera litura</i> <i>Hellula undalis</i> <i>Chrysodeixis eriosoma</i> <i>Crocidolomia binotalis</i> <i>Plutella xylostella</i>	Etofenprox 100 g/l EC Emamectin benzoate 5% SG Chlorfluazuron 50 g/l EC Bistfluron 100 g/l EC Tebufenozide 200 g/l SC Chromafenozone 50 g/l SC Chlorantraniliprole 200 g/l SC Neem Seed Water Extract Azadirachtin-A 7.5 g/l EC Azadirachtin 50 g/l EC Lufenuron 50 g/l EC Spinosad 25 g/l SC Flubendiamide 24% WG Indoxacarb 150 g/l EC	3 6 15 15 18 18 28 UN UN UN 15 5 28 22	24 ml 8 g 16 ml 24 ml 24 ml 32 ml 6 ml 640 g 48 ml 32 ml 16 ml 16 ml 6 g 5 ml	480 ml 160 g 320 ml 480 ml 480 ml 640 ml 120 ml 12 kg 960 ml 640 ml 320 ml 320 ml 120 g 160 ml	900 ml 300 g 600 ml 900 ml 900 ml 1200 ml 240 ml 24 kg 1800 ml 1200 ml 600 ml 600 ml 155 g 300 ml	07 10 10 07 14 07 03 07 07 07 07 14 07	Apply insecticides at the first sign of damage and repeat at 2 weeks intervals if necessary. Count caterpillars weekly in 12 plants at random and spray if the count exceeds 8 DBM or 4 larvae of the caterpillar species. Spot application at early stage of detection is more economical for <i>S.litura</i> and <i>C.binotalis</i>

Pesticide Recommendations

Insecticides

Crop/Pest	Common name, Formulation Type & Strength	MOA	Dilution (ml or g per 16L)	Rate of Application (Product ml or g/ ha)		PHI Days	Remarks
				Low foliage	High foliage		
Diamond back moth <i>Plutella xylostella</i>	Flubendiamide 24% WG	28	6 g	120 g	240 g	07	
	Spinosad 25 g/l SC	5	16 ml	320 ml	600 ml	07	
	Spinetoram 25% WG	5	4 g	80 g	150 g	07	
04. CROP: POTATO							
Tuber moth (Stores) <i>Phthorimaea operculella</i>	Pirimiphos-methyl 500 g/l EC	1	64 ml	-	-	-	Clean all stores well in advance of harvesting potatoes. Walls, floors and storage trays should be cleaned and sprayed with a residual insecticide and air-dried before storing seed potatoes.
	Acetamiprid 20% SP	4	16 g	-	-	14	
	Novaluron 100 g/l EC	15	16 ml	-	-	14	
	Thiocyclam (Hydrogen Oxalate) 50% SP	14	40 g /100 kg of seeds (for seed potato)			14	Inspect stores on a fortnightly basis. If there is any sign of insect damage apply a recommended insecticide.
Tuber moth (Field) <i>Phthorimaea operculella</i>	Chlorantraniliprole 20% + Thiamethoxam 20% WG	28+					When first sign of damage are seen, direct spray to under side of the foliage close to the stem and branches.
		4	5 g	100 g	120 g	10	
Mites <i>Tetranychus</i> spp.	Fenpyroximate 50 g/l EC	21	20 ml	400 ml	960 ml	14	
	Abamectin 18 g/l EC	6	10 ml	200 ml	360 ml	14	
	Hexythiazox 50 g/l EC	10	30 ml	600 ml	1000 ml	14	
	Neem Seed Water Extract	UN	640 g	12 kg	24 kg	07	
	Azadirachtin 10 g/l EC	UN	8 ml	160 ml	300 ml	07	
Leaf miner <i>Liriomyza huidobrensis</i>	Neem Seed Water Extract	UN	640 g	12 kg	24 kg	07	Under normal condition use IPM practices with bio control Agent Abamectin 18 g/l EC apply on only during epidemics
	Abamectin 18 g/l EC	6	10 ml	200 ml	360 ml	14	
	Azadirachtin 50 g/l EC	UN	16 ml	320 ml	600 ml	07	
Cyst nematode <i>Globodera rostochiensis</i>	Calcium hypochlorite 70%	UN	35 g/10 m ²	35 kg/ha			Apply to furrows at planting or one day before planting and cover with soil. Do not mix with inorganic fertilizers
05. CROP: TOMATO							
Fruit borer <i>Helicoverpa armigera</i>	Novaluron 100 g/l EC	15	16 ml	320 ml	600 ml	14	The first spraying may be done at the time of flowering and formation of fruits and repeat if necessary at 10-14 day intervals.
	Chlorfluazuron 50 g/l EC	15	24 ml	480 ml	900 ml	10	
	Chlorantraniliprole 200 g/l SC	28	4 ml	80 ml	130 ml	03	
	Fubendiamide 24% WG	28	5 g	100 g	180 g	07	
	Fubendiamide 20% WG	28	6 g	120 g	225 g	07	

Insecticides

Pesticide Recommendations

Crop/Pest	Common name, Formulation Type & Strength	MOA	Dilution (ml or g per 16L)	Rate of Application (Product ml or g/ ha) Low foliage High foliage	PHI Days	Remarks
06. CROP:TOMATO -POLYTUNNEL PESTS						
Leaf miner	Emamectin benzoate 5% SG	6	6 g	120 g 225 g	10	1. Apply only for larvae control
Fruit borer	Abamectin 18 g/l EC	6	10 ml	200 ml 375 ml	14	2. Apply minimum of seven days interval if the damage is seen.
<i>Tuta absoluta</i>	Indoxacarb 150 g/l EC	22	6 ml	120 ml 225 ml	14	3. The insect is showing high resistance for insecticides. Therefore, do not repeat same insecticide. recommended along with IPM practices.
Spinetoram 25% WG		5	4 g	80 g 150 g	14	
07. CROP: BEET ROOT						
Leaf miner	Neem Seed Water Extract	UN	640 g	12 kg 24 kg	07	Under normal condition use IPM practices with bio control Agent
<i>Liriomyza huidobrensis</i>	Abamectin 18 g/l EC	6	10 ml	200 ml 360 ml	14	
	Azadirachtin 50 g/l EC	UN	16 ml	320 ml 600 ml	07	Apply Abamectin 18 g/l EC only during epidemics.
08. CROP: BRINJAL & THIBBATU						
Shoot & fruit borer	Chromafenozide 50 g/l SC	18	32 ml	640 ml 1200 ml	07	Apply at flowering. Continue application at fortnightly intervals after harvesting. Repeated application of similar may lead to resistance buildup. Collect and destroy all damaged fruits and shoots before applying insecticides.
<i>Leucinodes orbonalis</i>	Chlorantraniliprole 200 g/l SC	28	3 ml	150 ml 210 ml	03	
	Flubendiamide 24% WG	28	8 g	160 g 250 g	07	
	Flubendiamide 20% WG	28	10 g	200 g 300 g	07	
	Etofenprox 100 g/l EC	3	24 ml	480 ml 900 ml	07	
	Deltamethrin 25 g/l EC	3	12 ml	225 ml 420 ml	07	
Leaf hopper	Acetamiprid 20% SP	4	16 g	320 g 400 g	14	Stop application at onset of fruiting.
<i>Amarasca spp.</i>	Acetamiprid 200 g/l SL	4	11 ml	220 ml 420 ml	14	
	Thiamethoxam 25% WG	4	5 g	100 g 125 g	14	
Mites	Fenpyroximate 50 g/l EC	21	20 ml	400 ml 960 ml	14	
<i>Tetranychus spp.</i>	Abamectin 18 g/l EC	6	10 ml	200 ml 360 ml	07	
	Hexythiazox 50 g/l EC	10	30 ml	600 ml 1000 ml	14	
	Neem Seed Water Extract	UN	640 g	12 kg 24 kg	07	
	Azadirachtin 50 g/l EC	UN	8 ml	160 ml 300 ml	07	

Pesticide Recommendations

Insecticides

Crop/Pest	Common name, Formulation Type & Strength	MOA	Dilution (ml or g per 16L)	Rate of Application (Product ml or g/ ha) Low foliage High foliage	PHI Days	Remarks
09. CROP: CUCURBITS (SNAKE GOURD, BITTER GOURD, RIDGE GOURD & CUCUMBER)						
Gall fly <i>Lasioptera falcata</i>	Profenophos 500 g/l EC	1	48 ml	960 ml	1800 ml	14
	Thiocyclam (Hydrogen Oxalate) 50% SP	14	40 g	800 g	2000 g	14
	Chlorantraniliprole 200 g/l SC	28	5 ml	100 ml	180 ml	03
Melon fly <i>Bactrocera cucurbitae</i>	Spinosad 25 g/l SC	5	20 ml + 400 ml Protein bait	1000 ml	2000 ml	07
			0.4 ml + 200 ml Protein bait			
Leaf hoppers <i>Amrasca</i> spp.	Acetamiprid 20% SP	4	16 g	320 g	400 g	14
	Thiamethoxam 25% WG	4	5 g	100 g	125 g	14

Insecticides

Pesticide Recommendations

Crop/Pest	Common name, Formulation Type & Strength	MOA	Dilution (ml or g per 16L)	Rate of Application (Product ml or g/ ha)		PHI Days	Remarks
				Low foliage	High foliage		
Mites <i>Tetranychus</i> spp.	Fenpyroximate 50 g/l EC	21	20 ml	400 ml	960 ml	14	Should be sprayed to the underside of the leaves at early infestation stage.
	Abamectin 18 g/l EC	6	10 ml	200 ml	360 ml	07	
	Hexythiazox 50 g/l EC	10	30 ml	600 ml	1000 ml	14	
	Neem Seed Water Extract	UN	640 g	12 kg	24 kg	07	
	Azadirachtin 50 g/l EC	UN	8 ml	160 ml	300 ml	07	
Beetles <i>Aulacophora</i> spp.	Thiocyclam (Hydrogen Oxalate) 50% SP	14	40 g	800 g	1000 g	14	
	Chlorantraniliprole 200 g/l SC	28	3 ml	100 ml	180 ml	03	
	Chlorantraniliprole 20% +	28 +					
	Thiomethoxam 20% WG	4	4 g	100 g	200 g	10	
	Profenophos 500 g/l EC	1	48 ml	960 ml	2400 ml	14	
10. CROP: OKRA							
Shoot and pod borer <i>Earias vitella</i>	Chlorantraniliprole 200 g/l SC	28	3 ml	60 ml	115 ml	03	1 Single application at flowering stage.
	Tebufenozide 200 g/l SC	18	24 ml	480 ml	900 ml	10	2. If infestation is further seen, harvest all pods & apply 3 - 14 days before harvesting
Leaf hopper <i>Amrasca</i> spp.	Acetamiprid 200 g/l SL	4	16 ml	320 ml	600 ml	14	Stop application at pod initiation stage.
	Acetamiprid 20% SP	4	46 ml	320 ml	600 ml	14	
	Thiamethoxam 25% WG	4	5 g	120 g	188 g	14	
LEAFY VEGETABLES							
11. MUKUNUWENNA							
Flea hopper <i>Halticus</i> spp.	Sulfoxaflor 50% WG	4	5 g	100 g	125 g	7	Recommended along with other IPM practices.
	Pymetrozine 50% WG	9	8 g	160 g	200 g	7	Apply only once per one cropping cycle either 7-14 days after pruning of the crop or whenever the damage is visible.
Leaf and planthoppers <i>Harmalia heitensis</i> <i>Amrasca</i> spp.	Sulfoxaflor 50% WG	4	4.8 g	100 g	125 g	7	Use an alternative after 7-14 days of application if the damage is severe. Strictly adopt the label recommendations and PHI
	Pymetrozine 50% WG	9	8 g	160 g	200 g	7	
	Thiocyclam (Hydrogen Oxalate) 50% SP	14	40 g	800 g	1000 g	14	

Pesticide Recommendations

Insecticides

Crop/Pest	Common name, Formulation Type & Strength	MOA	Dilution (ml or g per 16L)	Rate of Application (Product ml or g/ ha)	PHI Days	Remarks
				Low foliage	High foliage	
Flea beetle <i>Chaetocnema</i> spp.	Sulfoxaflor 50% WG	4	5 g	100 g	125 g	7
12. MUKUNUWENNA & GOTUKOLA						
Root knot nematodes <i>Meloidogyne</i> spp.	Abamectin 20 g/l SC	6	3.75 ml/ 10 m ²	3750 ml	3750 ml	14 Drench the selected area with recommended volume of nematicide + water mix before planting. Repeat the process after 2 weeks till 2 months after planting. Reapply two weeks after harvesting if necessary
13. BEANS, POTATO, CUCURBITS, TOMATO, BRINJAL, CAPSICUM AND OKRA - SUCKING PESTS						
Aphids <i>Aphis gossypii</i> <i>Aphis craccivora</i> , <i>Myzus persicae</i>	For seed treatment					
	Imidacloprid 70% WS	4				3.5 g/kg seeds
	Thiamethoxam 70% WS	4				
	Foliar spray					Recommended along with IPM practices. Spray early morning when the activity of whiteflies are low.
	Chlorantraniliprole 20% +	28+				Restrict spray sessions of same MOA products up to a maximum of two.
	Thiamethoxam 20% WG	4	4 g	80 g	150 g	10
	Thiocyclam (Hydrogen Oxalate) 50% SP	14	40 g	800 g	1500	14
	Buprofezin 10% WP	16	10 g	200 g	1500	14
	Sulfoxaflor 50% WG	4	5 g	100 g	200 g	14
	Pymetrozine 50% WG	9	8 g	160 g	400 g	14
	Buprofezin 250 g/l SC	16	45 ml	900 ml	1700 ml	14
Whiteflies <i>Bemisia tabaci</i> , <i>Trialeurodes vaporariorum</i>	Carbosulfan 200 g/l SC	1	32 ml	640 ml	1200 ml	14
	Ethiprole 100 g/l SC	2	20 ml	400 ml	750 ml	14
	Azadirachtin-A 7.5% EC	UN	45 ml	900 ml	1750 ml	07
	Imidacloprid 70% WS					seed treatment with 3.5kg seeds
	Chlorantraniliprole 20% +	28+				Recommended along with IPM practices. Spray early morning when the activity of whiteflies are low.
	Thiamethoxam 20% WG	4	4 g	100 g	200 g	10
	Thiocyclam (Hydrogen Oxalate) 50% SP	14	40 g	1000 g	1500	14
	Buprofezin 10% WP	16	10 g	190 g	375	14
	Buprofezin 250 g/l SC	16	45 ml	590 ml	1500 ml	05
	Sulfoxaflor 50% WG	4	5 g	100 g	200 g	14
	Pymetrozine 50% WG	9	8 g	160 g	300 g	14
	Azadirachtin 50 g/l EC	UN	16 ml	320 ml	600 ml	07
	Ethiprole 100 g/l SC	2	20 ml	400 ml	750 ml	14
	Azadirachtin-A 7.5 g/l EC	UN	45 ml	900 ml	1750 ml	07

Insecticides

Pesticide Recommendations

Crop/Pest	Common name, Formulation Type & Strength	MOA	Dilution (ml or g per 16L)	Rate of Application (Product ml or g/ ha)		PHI Days	Remarks
				Low foliage	High foliage		
Thrips <i>Scirtothrips dorsalis</i> <i>Thrips palmi</i>	Imidacloprid 70% WS	4	2 g				seed treatment with 3.5kg seeds
	Imidacloprid 70% WG	4	2 g	60 g	-	14	Recommended along with IPM practices. Spray early morning when the activity of whiteflies are low.
	Chlorantraniliprole 20% +	28+					Restrict spray sessions of same MOA products up to a maximum of two.
	Thiamethoxam 20% WG	4	4 g	80 g	150 g	10	
	Thiocyclam (Hydrogen Oxalate) 50% SP	14	40 g	800 g	1500	14	Eggs and immature stages are controlled by Buprofezin
	Sulfoxaflor 50% WG	4	5 g	100 g	200 g	14	
	Pymetrozine 50% WG	9	8 g	160 g	300 g	14	
FRUITS	Buprofezin 25% SC	16	45 ml	590 ml	1500 ml	14	
	Fipronil 50 g/l SC	2	16 ml	320 ml	600 ml	14	
	Azadirachtin 50 g/l EC	UN	16 ml	320 ml	600 ml	07	
	Azadirachtin-A 7.5 g/l EC	UN	45 ml	900 ml	1750 ml	07	

14. CROP : GUAVA

Root knot nematodes <i>Meloidogyne</i> spp.	Abamectin 20 g/l SC	6	9 ml/plant	3750 ml		14	<ul style="list-style-type: none"> 1. Drench the soil at planting. 2. Repeat application to wet the whole root system in one-month interval up to two consecutive months. 3. After six months of planting, another two consecutive applications in one month interval. 4. Continue this practice for three years
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15. CROP : MANGO

Leaf hopper <i>Idioscopus</i> spp. <i>Amritodus</i> spp.	Imidacloprid 200 g/l SL Thiamethoxam 25% WG	4 4	16 ml 16 g	- -	- -	14 14	<ul style="list-style-type: none"> Prior to new flush growth spray to colonized areas on the trunk & foliage as spot applications. If necessary, apply at flower initiation & new flush growth
Fruit fly <i>Bactrocera</i> spp.	Spinosad 25 g/l SC	5	20 ml + 400 ml of protein bait	1000 ml	2000 ml	07	<p>Application of protein bait is a major component in IPM practices.</p> <p>First application method (spot)</p> <ol style="list-style-type: none"> 1 Protein bait should be applied in spots on to the underside of leaves using knapsak sprayer . 2 Spraying in the morning before 9.00 am is more effective. 3 Reapply in 5-7 day interval

Pesticide Recommendations

Insecticides

Crop/Pest	Common name, Formulation Type & Strength	MO	Dilution (ml or g per 16L)	Rate of Application (Product ml or g/ ha)		PHI Days	Remarks
				Low foliage	High foliage		
	Spinosad 25 g/l SC	5	0.4 ml + 200 ml of protein bait (No water added)				Second application method (Trap) 1. Make a PVC ring (one side at an angle) 9.0 cm diameter width - upper side 6-7 cm, lower side 2.5 cm painted in yellow 2. Insert a sponge disc (2.5 cm thick) in to the PVC ring 3. Hang the trap in verticle position wider side top position 4. Apply the bait mixture as a thick ring on the sponge (4-5 ml trap) 5. Reapply mixture at 10-14 day intervals.
Stem borers and tree borers <i>Batocera</i> spp.	Fipronil 50 g/l SC	3	16 ml	-	-	14	Common Remove the damaged fruits into a black polythene bag, tie the mouth up & keep exposed to the sunlight. Spraying/trapping should be initiated one month after flowering.
16. CROP : BANANA							
Banana Stem Weevil <i>Odoiporus longicollis</i>	Fipronil 0.3% GR Thiocyclam (Hydrogen Oxalate) 4% GR	2 14		10 g/trap 10 g/trap			Prepare traps using 6-10 cm fresh pseudo stems and sandwiched with a recommended insecticide. Place 25 traps/Ac. Replace traps at 14-day intervals.
17. CROP : PINEAPPLE							
Mealy bug <i>Dysmicoccus brevipes</i>	Carbosulfan 200 g/l SC Acetamiprid 200 g/l SP	1 4	48 ml 16 g	- -	- -	14 14	Dip planting materials in one of the recommended insecticide solutions for 5 minutes. Allow to dry for a day. To prevent crown rot treat with fungicide containing Metalaxyl 8% + Mancozeb 64% and leave to dry for another day before transplanting. At the end of the first harvest, monitor ant/mealy bug incidences. If infestation is seen apply one of the above insecticides at same dilution. Direct the spray to the base of the leaves and the crown.

Crop/Pest	Common name, Formulation Type & Strength	MOA	Dilution (ml or g per 16L)	Rate of Application (Product ml or g/ ha)	PHI Days	Remarks
OTHER FIELD CROPS						
18. CROPS : MAIZE, FINGER MILLET AND SORGHUM						
Stem borer	Fipronil 0.3% GR	2		12 kg	14	Place granules in the central whorl at 3 and 5 weeks
<i>Chilo partellus</i>	Thiocyclam (Hydrogen Oxalate)	14		15 kg	14	after planting.
<i>Sesamia</i> spp.	4% GR					
	Etofenprox 100 g/l EC	3	24 ml	480 ml	900 ml	07
	Novaluron 100 g/l EC	15	16 ml	320 ml	600 ml	14
	Thiodicarb 375 g/l SC	1	32 ml	640 ml	1200 ml	14
Cob borer	Etofenprox 100 g/l EC	3	24 ml	480 ml	900 ml	07
<i>Helicoverpa armigera</i>	Novaluron 100 g/l EC	15	16 ml	320 ml	600 ml	14
	Thiodicarb 375 g/l SC	1	32 ml	640 ml	1200 ml	14
Fall Armyworm	Spinetoram 25% WG	5	5 g	100 g	190 g	07
<i>Spodoptera frugiperda</i>	Spinosad 25 g/l SC	5	16 ml	320 ml	600 ml	07
	Emamectin benzoate 5% SG	6	6 g	120 g	225 g	07
	Chlorantraniliprole 200 g/l SC	28	5 ml	100 ml	190 ml	03
	Chlorantraniliprole 20% +	28 +				
	Thiamethoxam 20% WG	4	4 g	80 g	150 g	14
19. CROP : CHILLI						
Leaf curl complex	Carbosulfan 200 g/l SC	1	48 ml	960 ml	1800 ml	14
Thrips	Thiamethoxam 25% WG	4	16 g	320 g	600 g	14
<i>Scirtothrips dorsalis</i>	Imidacloprid 200 g/l SL	4	16 ml	320 ml	600 ml	14
Aphids	Abamectin 18 g/l EC	6	9.6 ml	190 ml	360 ml	07
<i>Aphis gossypii</i>	Pymetrozine 50% WG	9	8 g	160 g	300 g	14
<i>Myzus persicae</i>	Lufenuron 50 g/l EC	15	32 ml	640 ml	1200 ml	14
Whiteflies	Fenobucarb 500 g/l EC	1	32 ml	640 ml	1200 ml	14
<i>Bemisia tabaci</i>	Acephate 75% SP	1	16 g	320 g	600 g	14
	Profenophos 500 g/l EC	1	32 ml	640 ml	1200 ml	14
Mites	Abamectin 18 g/l EC	6	9.6 ml	190 ml	360 ml	07
<i>Hemitarsonemus latus</i>	Sulphur 80% WP	UN	128 g	2500 g	4800 g	07
Pod borers	Chlorfluazuron 50 g/l EC	15	16 ml	320 ml	600 ml	10
<i>Helicoverpa armigera</i>						
<i>Spodoptera litura</i>						

Pesticide Recommendations

Insecticides

Crop/Pest	Common name, Formulation Type & Strength	MOA	Dilution (ml or g per 16L)	Rate of Application (Product ml or g/ ha)		PHI Days	Remarks
20. CROP : ONION							
Thrips	Fipronil 50 g/l SC	2	16 ml	320 ml	400 ml	14	Insecticides should be applied at first sign of infestation. Repeat application if necessary at 10-14-day intervals.
<i>Thrips tabaci</i>	Imidacloprid 200 g/l SL	4	16 ml	320 ml	400 ml	14	
	Thiaclorpid 240 g/l SC	4	16 ml	320 ml	400 ml	14	
Onion caterpillars	Emamectin benzoate 5% SG	6	6 g	120 g	160 g	07	Insecticides should be applied at first sign of infestation. Spray in the evening.
<i>Spodoptera litura</i>	Chlorfluazuron 50 g/l EC	15	16 ml	320 ml	400 ml	10	
<i>Spodoptera exigua</i>	Metaflumizone 240 g/l EC	22	40 ml	800 ml	1000 ml	14	
	Lambda-cyhalothrin 50 g/l CS	3	8 ml	160 ml	300 ml	07	
	Deltamethrin 25 g/l EC	3	10 ml	190 ml	240 ml	07	
21. CROP : GRAIN LEGUMES (MUNGBEAN, COWPEA, BLACKGRAM, SOYBEAN)							
Bean fly	Seed Treatment						
<i>Ophiomyia phaseoli</i>	Thiamethoxam 70% WS	4		1.5 g/kg seed			Mix 1.5 g of insecticide in 8 - 10 ml of water and mix with 1 kg of seeds and keep for about 1 hour before planting. Wear gloves when handling chemicals and planting treated seeds.
	Carbosulfan 200 g/l SC	1	48 ml	960 ml	1800 ml	14	Apply at 7 days after planting or when first pair of leaves appear and repeat after 2 weeks if necessary. Repeat application at flowering if infection is severe.
Legume pod borers	Etofenprox 100 g/l EC	3	24 ml	480 ml	900 ml	07	Start spraying at flowering and repeat at 10-14-day intervals, if necessary.
<i>Maruca vitrata</i>	Novaluron 100 g/l EC	15	16 ml	320 ml	600 ml	14	
<i>Helicoverpa armigera</i>	Chlorfluazuron 50 g/l EC	15	16 ml	320 ml	600 ml	10	
<i>Lampides boeticus</i>							
Pod sucking bugs	Imidacloprid 70% WG	4	2.4 g	48 g	90 g	14	
<i>Nezara viridula</i>	Thiaclorpid 240 g/l SC	4	16 ml	320 ml	600 ml	14	
<i>Riptortus spp.</i>							
<i>Anaplocnemis spp.</i>							
OIL SEED CROPS							
22. CROP : SESAME							
Leaf webber	Neem Seed Water Extract	UN	640 g	12 kg	24 kg	7	Insecticides should be applied to the growing points when damage symptoms appear.
<i>Antigastra catalaunalis</i>	Chlorfluazuron 50 g/l EC	15	48 ml	960 ml	1800 ml	10	
	Tebufenozide 200 g/l SC	18	24 ml	480 ml	900 ml	10	

Crop/Pest	Common name, Formulation Type & Strength	MOA	Dilution (ml or g per 16L)	Rate of Application (Product ml or g/ ha)		PHI Days	Remarks
23. CROP : MUSTARD							
Leaf eating caterpillars	Etofenprox 100 g/l EC	3	24 ml	480 ml	900 ml	07	Apply insecticides at the first sign of damage and repeat at 2-week intervals if necessary. Count caterpillars weekly in 12 plants at random and spray if the count exceeds 8 DBM or 4 larvae of the caterpillar species. Spot application at early stage of detection is more economical for <i>S.litura</i> and <i>C.binotalis</i>
<i>Spodoptera litura</i>	Emamectin benzoate 5% SG	6	6 g	120 g	225 g	10	
<i>Hellula undalis</i>	Chlorfluazuron 50 g/l EC	15	16 ml	320 ml	600 ml	10	
<i>Chrysodeixis eriosoma</i>	Bistrifluron 100 g/l EC	15	24 ml	480 ml	900 ml	07	
<i>Crocidolomia binotalis</i>	Tebufenozide 200 g/l SC	18	24 ml	480 ml	900 ml	14	
<i>Plutella xylostella</i>	Chromafenozide 50 g/l SC	18	32 ml	640 ml	1200 ml	07	
	Chlorantraniliprole 200 g/l SC	28	6 ml	120 ml	240 ml	03	
	Neem Seed Water Extract	UN	640 g	12 kg	24 kg	07	
	Azadirachtin-A 7.5 g/l EC	UN	48 ml	1280 ml	1800 ml	07	
	Lufenuron 50 g/l EC	15	16 ml	320 ml	600 ml	14	
24. STORED PRODUCT PESTS							
RICE							
Rice moth	Pirimiphos-methyl 500 g/l EC	1	40 ml				Clean all stores well in advance of harvesting. Walls, floors and storage bags should be cleaned and given residual spray and air dried before storing products.
<i>Sitotroga cerealella</i>							
Rice weevil							
<i>Sitophilus oryzae</i>							
Red flour beetle							
<i>Tribolium castaneum</i>							
	Deltamethrin	3					Deltamethrin 318 mg/m ² Incorporated bag (zero bag). Protection against insect pests of seed paddy (restricted).
PULSES							
Pulse bruchids	Pirimiphos-methyl 500 g/l EC	1	40 ml				
<i>Callosobruchus</i> spp.							
25. OCCATIONAL PESTS (CARROTS, CABBAGE & POTATO)							
Snails & slugs						15 g/10 m ²	
<i>Achatina</i> spp.	Metaldehyde 3% RB					Mix with sufficient water to form balls,	
<i>Aplysoa</i> spp.	Metaldehyde 4% RB					Place at several points in the garden.	
<i>Deroceras reticulatum</i>	Metaldehyde 6.5% RB					Apply in bands between rows or broadcast in soil.	
Root eating ants							
<i>Dorylus orientalis</i>						Apply to soil around plants when damage is observed.	
Termites	Imidacloprid 200 g/l SL	4	8 ml	160 ml	14	Apply insecticides to wet the infested area.	
<i>Odontotermes</i> spp.	Thiamethoxam 25% WG	4	4.8 g		14		

Pesticide Recommendations

Insecticides

Crop/Pest	Common name, Formulation Type & Strength	MOA	Dilution (ml or g per 16L)	Rate of Application (Product ml or g/ ha)		PHI Days	Remarks
				Low foliage	High foliage		
Scales and Mealy bugs	Imidacloprid 200 g/l SL	4	16 ml	320 ml	400 ml	14	Do not use on papaya mealy bug.
	Fipronil 50 g/l SC	2	16 ml	320 ml	400 ml	14	
	Thiomethoxam 25% WG	4	8 g	160 g		14	
	Acetamiprid 200 g/l SL	4	16 ml	320 ml	400 ml	14	
26. CROP : TEA							
Nematodes	Metham sodium 423 g/l E	8				n/a	800 ml per one cube of soil. Nursery fumigation. Sprinkle the chemical evenly on the surface of soil heap and mix into the soil immediately.
Root lesion nematode <i>Pratylenchus loosi</i>							
Burrowing nematode <i>Radopholus similis</i>							
Root knot nematode <i>Meloidogyne brevicauda</i>							
Mites	Sulphur 80% WG/WP	UN				n/a	Apply for 3500 nursery plants at the rate of 22.5 g /4.5 l knapsack sprayer, 900 l of water
Red spider mite <i>Oligonychus coffeae</i>			80 g/l	4.5 kg			
Scarlet mite <i>Brevipalpus californicus</i>			288 g/l	4.5 kg			
Yellow mite <i>Hemitarsonemus latus</i>						n/a	250 l of water, mist blower
Purple mite <i>Calacarus carinatus</i>							Young tea not brought into bearing and fields recovering from pruning
Pink rust mite <i>Acaphylla theae</i>							

Insecticides

Pesticide Recommendations

Crop/Pest	Common name, Formulation Type & Strength	MOA	Dilution	Rate of Application		PHI Days	Remarks
			(ml or g per 16L)	Product ml or g/ ha)	Low foliage		
Shot Hole Borer <i>Xyleborus fornicatus</i>	Fipronil 50 g/l SC	2	8 ml	1 st Spray:		n/a	5 ml in 4.5 l of water for 3500 nursery plants per application. Prophylactic treatments for nursery plants. Spray onto susceptible stems and branches of 8-10 months old nursery plants in 250 l (knapsack sprayer)
				2 nd Spray:	400 ml		Prophylactic treatments for young, immature tea and new clearings. Spray I: Spray onto susceptible stems/ branches, 6 - 10 months after planting Spray II: Spray onto susceptible stems/branches of 2 nd and 3 rd year plants in 500 l (knapsack sprayer)
Lime Sulphur	UN	-	-	-	-	n/a	Prophylactic treatments for nursery plants. Lime: Sulphur 1:1 100 g of Lime & 100 g of Sulphur in 4.5 l water for 3500 plants per application
						07	Prophylactic treatments for young, immature tea and new clearings Lime Sulphur 1:1 1 st Spray: 6-10 months after planting: 6.25 kg of Lime and 6.25 kg of Sulphur in 250 l water per ha by knapsack sprayer 2 nd Spray: 2 nd and 3 rd year plants: 12.5 kg of Lime and 12.5 kg of Sulphur in 500 l water per ha by knapsack sprayer
							Prophylactic treatments for mature tea fields. Lime Sulphur 1:1 25 kg of Lime and 25 kg of Sulphur to be used in 1000 l water per ha by knapsack sprayer

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Pesticide Recommendations

Insecticides

Crop/Pest	Common name, Formulation Type & Strength	MOA	Dilution (ml or g per 16L)	Rate of Application (Product ml or g/ ha) Low foliage High foliage	PHI Days	Remarks
Ants <i>Crematogaster</i> spp.		1	32 ml		07	Apply appropriate volume into ant nest from a solution prepared
White grubs (Cockchafer larva) <i>Holotrichia disparilis</i> <i>Microtrichia costata</i>	Chlorantraniliprole 200 g/l SC	28	16 ml		n/a	Apply 200-400 ml per immature plants

27. CROP : CASHEW

Cashew stem and root borer <i>Plocaederus ferrugineus</i>	Tebufenozide 200 g/l SC	18	44.8 ml	2.8 ml/tree		Apply as scattered horizontal cuts (6 cm) on damage areas of infested barks
	Novaluron 100 g/l EC	14	16 ml	1 ml/tree		
	Phenthroate 500 g/l EC	1	44.8 ml	2.8 ml/tree	21	-do-
Sap sucking bug <i>Helopeltis antonii</i>	Acetamiprid 20% (w/w) SP	4	16 g	3 g/tree or 600 g/ha	21	An alternative insecticide for 2 nd application is recommend. Early morning/Late afternoon
	Carbosulfan 200 g/l SC	1	44.8 ml	8.4 ml/tree	21	

28. CROP : SUGARCANE

Termite	Fipronil 0.3% GR	2	-	30 kg	14	Apply on soil near root zone
Sugarcane Wooly Aphid (SWA)	Thiamethoxam 20% WG	4	5 g		14	If SWA presence on leaves more than 5%, spray under side of infested leaves
Internode Borer (INB)	Fipronil 0.3% GR	2	-	18 kg	14	Incorporate in to the soil near root zone in the fields with damage 10% or more

Crop(s)/ Intended use	Common name, Formulation Type & Strength	MOA	Dilution (product per 10 L water)	Rate of Application (product ml/ha or g/ha)	Time of application	Application intervals in days (only if subsequent applications are required)	PHI Days	Remarks
29. CROP : CINNAMON								
Cinnamon wood boring moth <i>Ichneumonoptera cinnamomumi</i>	Fipronil 50 g/l SC Imidacloprid 70% WG Imidacloprid 200 g/l SL	2 4 4	16 ml 2.4 g 16 ml	900 ml 135 g 900 ml	Initial stage of the damage (more effective)	Twice at 2 months interval	30	It is recommended to adding soil to bottom of the plants after chemical application
Cinnamon thrips	Imidacloprid 70% WG Imidacloprid 200 g/l SL	4 4	2.4 g 16 ml	135 g 900 ml	Initial stage of the damage (more effective)	Twice at 2 weeks interval	21	Most effective stage is flushing stage of the plants
Upper leaf galls <i>Trioza cinnamomi</i> Lower leaf galls <i>Eriophys boisi</i>	Abamectin 18 g/l EC	6	9.6 ml	540 ml	Initial stage of the damage (more effective)	Twice at 2 weeks interval	21	It is only recommended in nursery & less than 3 years aged plant
White grubs	Thiamethoxam 20% + Chlorantraniliprole 20% WG	4+28	4 g	225 g	2 weeks Before planting or damage present after planting	Twice at 2 weeks interval		Clean weeding is not recommended when the damage is severe. Apply at young age
30. CROP : BLACK PEPPER								
Lace Bug <i>Diconocoris distanti</i>	Acetamiprid 20% SP	4	16 g	320 g				
Thrips <i>Gynaikothrips karny</i>	Imidacloprid 70% WG	4	2.4 g	48 g				
Vine Borer <i>Pterolophia annualata</i>	Fipronil 50 g/l SC	2	8 ml	160 ml				
Root Mealy Bug <i>Planococcus citri</i>	Fipronil 50 g/l SC	2	8 ml	2125 ml				Drench the base of the plant and apply
31. CROP : NUTMEG								
Stem borer <i>Xyleborus dedeviganulatus</i>	Fipronil 50 g/l SC	2	16 ml	560 ml				1:1 dilution for trunk treatment
Scale insects	Thiamethoxam 25% WG Imidacloprid 70% WG	4 4	8 g 4 g	700 g 350 g				

Pesticide Recommendations

Insecticides

Crop(s)/ Intended use	Common name, Formulation Type & Strength	MOA	Dilution (product per 10 L water)	Rate of Application (product ml/ha or g/ha)	Time of application	Application intervals in days (only if subsequent applications are required)	PHI Days	Remarks
32. CROP : CLOVE								
Steam borer <i>Xyleborus dedeviganulatus</i>	Fipronil 50 g/l SC	2	16 ml	560 ml				1:1 dilution for trunk treatment
Scale insects	Thiamethoxam 25% WG	4	8 g	700 g				
	Imidacloprid 70% WG	4	4 g	350 g				
Rhizome mealy bug <i>Aspidiella hartii</i>	Thiamethoxam 25% WG	4	8 g	630 g				Seed treatment before planting
	Imidacloprid 70% WG	4	4 g	315 g				
33. CROP : COCONUT								
Red weevil <i>Rhynchophorus ferrugineus</i>	Monocrotophos 600 g/l SL	1						If the trunk girth is less than 100 cm 30 ml / palm by trunk injection.If the trunk girth is more than 100 cm 40 ml /palm by trunk injection
Black beetle <i>Oryctes rhinoceros L.</i>	Naphthalene balls		2-3 balls per frond base					every 2 month. 1. Application of burnt engine oil/Coal tar on the base of 2-3 inner most leaf petioles (preferably the distal end of the petiole) to repel beetles
Coconut mite <i>Aceria guerreonis</i>	Sulphur 80% WP/WG	UN	100 g			Every 6 month		Replace once a month 2. Placement of naphthalene balls bat the base of each frond
								Palm/vegetable oil - 200 ml Soap powder- 12 g. Spray bunches from ground, except the unfertilized inflorescences)

Crop/Pest	Common name, Formulation Type & Strength	MOA	Dilution (ml or g per 16L)	Dosage/Palm	PHI Days	Remarks
34. CROP : COCONUT						
Coconut caterpillar <i>Opisina arenosella</i>	Monocrotophos 600 g/l SL Carbosulfan 200 g/l SC	1 1				Trunk injection of 8 ml (undiluted) For seedlings: spray 4 ml/11
Plesispa beetle <i>Plesispa reichei</i>	Carbosulfan 200 g/l SC	1	64 ml		3-4 weeks	Mix 4 ml per 11 water and spray to wet the bud region
Coconut Scale <i>Aspidiotus desructo</i> r	Monocrotophos 600 g/l SL	1				Trunk injection of 8 ml (undiluted)
Nettle grub <i>Parasa lepida</i>	Monocrotophos 600 g/l SL	1				Trunk injection of 10 ml (undiluted)
Termites	Imidacloprid 200 g/l SL	4	16-32 ml			1-2 ml/l. Dip the seed nut for 5 minutes or drench the nursery bed with 5 l per m ² or seedlings in the polybags
Leaf eating caterpillars <i>Telicota palmarum</i> <i>Elymnias hypermnestra</i>	Carbosulfan 200 g/l SC	1A	64 ml			Spray with a solution of 4 ml/l
35. CROP : ANTHURIUM, ORCHID, ROSE, CHRYSANTHEMUM, FOLIAGE PLANTS AND FLOWRING ORNAMENTAL						
Mites	Sulphur 80% WP/WG	UN	128 g	6-8	07	
<i>Tetanychus</i> spp.	Abamectin 18 g/l EC	6	16 ml	7-10	07	
<i>Tenuipalpus</i> spp.	Hexythiazox 10% WP	10	12.8 g	7-10	07	
Thrips	Imidacloprid 200 g/l SL	4	16 ml	7-10	14	
<i>Heliothrips</i> spp.	Thiamethoxam 25%	4	8 g	7-10	14	
<i>Thysanoptera</i> spp.	WG					
	Fipronil 50 g/l SC	2	16 ml	7-10	07	
Mealy Bug	Acetamiprid 200 g/l SC	4	16 g	7-10	14	
<i>Psedococcus</i> spp.	Imidacloprid 200 g/l SL	4	200 g	7-10	14	
<i>Ferrisia virgate</i>						
<i>Dysmicoccus brevipes</i>						
Whitefly	Imidacloprid 200 g/l SL	4	16 ml	7-10		
<i>Bemisia tabaci</i> ,	Imidacloprid 70% WG	4	16 ml	7-10		
<i>Alurodicus disperses</i>	Thiamethoxam 25%	4	8 g	7-10		
<i>Trialeurodes</i>	WG					
<i>vaporariorum</i>	Acetamiprid 200 g/l SC	4	11 g	7-10		

Name of the Pest/ Disease/Pathogen/ Weed(s) & correspond- ing scientific Name	Common name, Formulation type & Strength	MOA	Dilution (product per 10 L water)	Application in days (only if subsequent applications are required)	PHI Days	Remarks
36. CROP : ORCHID						
Yellow beetle <i>Lema pectoralis</i>	Acetamiprid 200 g/l SC	4	16 g	7-10	14	Affects Flowers only, manually picking & destroying beetles is possible in small cultivations
Stem borers <i>Chilo partellus</i> <i>Sesamia</i> spp. <i>Batocera</i> spp.	Fipronil 50 g/l SC Carbosulfan 200 g/l	2 1	16-20 ml 2 g/plant	7-10 7-10	07 14	
Armoured Scales <i>Chrysomphalus aonidum</i> <i>Pseudalacaspis pentagona</i> <i>Aspidiotus</i> spp. <i>Lepidosaphes beckii</i>	Imidacloprid 200 g/l SC Fipronil 50 g/l SC	4 2	16 ml 16 ml	7-10 7-10	14 07	
Soft scales <i>Coccus</i> spp. <i>Pulniner</i> spp. <i>Saissetia</i> spp. <i>Ceroplastes</i> spp.						
37. CROP : ROSE						
Scales <i>Coccus</i> spp <i>Pulniner</i> spp <i>Saissetia</i> spp <i>Ceroplastes</i> spp	Imidacloprid 200 g/l SC Fipronil 50 g/l SC	4 2	16 ml 16 ml	7-10 7-10	14 07	
38. CROP : CHRYSANTHEMUM						
Leaf miner <i>Liriomyza</i> spp.	Abemactin 18 g/l EC	6	10 ml	7-10	14	Traps with yellow polythene covered or made sticky with gres or gum is helpful in physical control of adults
Aphids <i>Aphis gossypii</i> <i>Myzus persicae</i> <i>Macrosiphum</i> spp.	Imidacloprid 200 g/l SC Imidacloprid 70% WG Thiamithoxam 25% WP Acetamiprid 20% SP Fipronil 50 g/l SC	4 4 4 4 2	16 ml 2 g 8 g 11 g 16 ml	7-10 7-10 7-10 7-10 7-10	7-10 7-10 7-10 7-10 7-10	

Name of the Pest/ Disease/Pathogen/ Weed(s) & correspond- ing scientific Name	Common name, Formulation type & Strength	MOA	Dilution (product per 10 L water)	Application in days (only if subsequent applications are required)	PHI Days	Remarks
39. CROP : FOLIAGE PLANTS AND FLOWRING ORNAMENTALS, DALIA						
Scales	Imidacloprid 200 g/l SC	4	16 ml	7-10	14	
<i>Aspidiotus</i> spp.	Fipronil 50 g/l SC	2	16 ml	710	07	
<i>Ceroplastes</i> spp.						
Thrips	Imidacloprid 200 g/l SC	4	16 ml	7-10	14	
<i>Heliothrips</i> sp.	Imidacloprid 70% WG	4	2 g	7-10	14	
<i>Thysanoptera</i> sp.	Thiamethoxam 25% WP	4	8 g	7-10	14	
	Fipronil 50 g/l SC	2	16 ml	7-10	07	
Leaf eating caterpillars	Chorfluazuron 50 g/l SL	15	16 ml	7-10	14	
<i>Spodoptera litura</i>	Etopenprox 100 g/l EC	3	24 ml	7-10	14	
<i>Hellula undalis</i>	Emamectin benzoate	6	6 g	7-10	14	
<i>Chrysodeixis eriosoma</i>	Indoxcarb 150 g/l EC	22	6 ml	7-10	14	
<i>Crocidiolomia binotalis</i>	Profenophos 500 g/l EC	1	48 ml	7-10	14	
<i>Plutella xylostella</i>						
40. HIBISCUS						
Weevils	Acephate 75% SP	1	8 g	120-240 g	7-10	14
<i>Pempheris affinis</i>						
Beetles	Imidacloprid 200 g/l SC	4	10 ml	120-240 g	7-10	14
<i>Mylabris phalerata</i>	Acephate 75% SP	1	8 g			
Boll worms	Profenophos 500 g/l EC	1	2 ml	50 ml	10-14	14
<i>Earias insulana</i>						
<i>Earias vitella</i>						
41. DAHLIA						
Beetles	Imidacloprid 200 g/l EC	4	16 ml	7-10		
<i>Mylabris phalerata</i>	Acephate 75% SP	1	12.8 g	7-10		
Leaf Hopper	Acephate 75% SP	1	12.8 g	7-10		
<i>Amarasca</i> spp.	Acetamiprid 200 g/l SP	4	16 g			

Pesticide Recommendations

Insecticides

Name of the Pest/Disease/ Pathogen/Weed(s) & corresponding scientific Name	Common name, Formulation type & Strength	MOA	Dilution (product per 10 L water)	Rate of Application product ml/ha or g/ha) (pl. give rates applicable to low, medium & high foliage as applicable)	Application in days (only if subsequent applications are required)	PHI Days	Remarks
42. GYPSOPHILA							
Leaf hopper	Acephate 75% SP	1	12.8 g	120-240 g	7-10	07	Spider Mites, Thrips
<i>Amarasca</i> spp.	Acetamiprid 200 g/l SP	4	16 g	200 g/ha	7-10	07	Aphids Similar to other flowers
43. LAWN GRASSES							
White Grubs	Chlorantraniliprole 200 g/l	5	40 ml	250-375 ml	7-10	-	Only as preventive
<i>Melolontha</i> spp.		4	32 ml	200-250 ml	7-10		hence should be
<i>Anomala</i> spp.	Imidacloprid 200 g/l SL	4	12.8 g	80-100 g	7-10		sprayed early before adult beetles form
Thiamethoxam 25% WG							

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* Foliage plants include Aglaonema, Dieffenbachia, Dracaenas, Cordyline, Philodendron, Maranta, Calathea, Syngonium, Scindapsus, Begonia, Cypress, Peperomia etc.

* Flowering ornamentals include Hibiscus, Bougainvillea, Jasmine, Ixora, Jatropha etc.

FUNGICIDES

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Department of Agriculture
Peradeniya
2019

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Crop/Pest	Common name, Formulation Type & Strength	MOA	Dilution (Product/ 16 L of water)	Rate of Application (Product/ha) Depend on the size of the foliage		Application interval (days)	PHI (days)	Remarks			
				Low	High						
01. CROP - RICE											
Blast <i>Magnaporthe grisea</i>	Tebuconazole 250 g/l EW	G1	10 ml	192 ml	360 ml	7-10	21				
	Isoprothiolane 400 g/l EC	F2	20 ml	400 ml	750 ml	7-10	14				
	Carbendazim 50% WP	B1	11 g	225 g	420 g	10-14	14				
	Carbendazim 500 g/l SC	B1	11 ml	225 ml	420 ml	10-14	14				
	Tricyclazole 75% WP	I1	10 g	192 g	360 g	10-14	14				
Sheath blight <i>Rhizoctonia solani</i>	Tebuconazole 250 g/l EW	G1	10 ml	192 ml	360 ml	7-10	21	Fungicide spray should be directed to the leaf sheath.			
	Pencycuron 25% WP	B4	32 g	640 g	1200 g	7-14	14				
	Hexaconazole 50 g/l EC	G1	32 ml	640 ml	1200 ml	7-14	21				
	Thiophanate-methyl 70% WP	B1	16 g	320 g	600 g	7-14	14				
	Propiconazole 250 g/l EC	G1	16 ml	320 ml	600 ml	7-14	21				
02. DISEASES IN VEGETABLE (TOMATO, CHILLI, CAPSICUM, BRINJAL, CABBAGE) NURSERIES											
Damping-off <i>Pythium</i> spp. <i>Phytophthora</i> spp. <i>Rhizoctonia</i> spp. <i>Sclerotium</i> spp. <i>Fusarium</i> spp.	Captan 50% WP	M3	Seed treatment	3 g/kg (Large seeds) 6 g/kg (Small seeds)		6-8 10-12 6-8 7-10	14 14 14 14	Seed treatments should be done just before sowing. Burning or solarisation is the best to eliminate most soil-borne pathogens in nursery beds. Use broad spectrum fungicides (Captan and Thiram) if the causal fungus is not identified. Thiophanate-methyl is highly effective on <i>Fusarium</i> spp. and <i>Sclerotium rolfsii</i> . But it is not effective on <i>Pythium</i> spp. and <i>Phytophthora</i> spp. (water moulds). Soil should be treated with fungicide mixture 3 days before sowing. Soil drenching in the field is recommended only as a spot application.			
	Thiram 80% WP	M3		2 g/kg (Large seeds) 5 g/kg (Small seeds)							
	Thiophanate-methyl 50% + Thiram 30% WP	B1+M3		2 g/kg (Large seeds) 4 g/kg (Small seeds)							
	Captan 50% WP	M4		60 g/50 l/10 m ²							
	Flutolanil 50% WP	C2		30 g/50 l/10 m ²							
	Thiram 80% WP	M3		70 g/50 l/10 m ²							
	Thiophanate-methyl 50% + Thiram 30% WP	B1+M3		50 g/50 l/10 m ²							

Crop/Pest	Common name, Formulation Type & Strength	MOA	Dilution (Product/ 16 L of water)	Rate of Application (Product/ha) Depend on the size of the foliage		Application interval (days)	PHI (days)	Remarks
				Low	High			
03. BEAN								
Angular leaf spot <i>Isariopsis griseola</i>	Propiconazole 250 g/l EC*	G1	6 ml	112 ml	210 ml	7-14	21	Last application should be done one week before flowering.
	Hexaconazole 50 g/l EC*	G1	6 ml	112 ml	210 ml	7-14	21	Alternate application of systemic* fungicide with contact fungicide is recommended.
	Hexaconazole 50 g/l SC*	G1	6 ml	112 ml	210 ml	7-14	21	
	Each above followed by Propineb 70% WP	M3	32 g	640 g	1200 g	7-10	14	
	Metiram 55% + Pyraclostrobin 5% WG*	M3+C3	32 g	640 g	1200 g	10-12	14	Maximum number of applications per season must be limited to three.
Rust <i>Uromyces appendiculatus</i>	Propiconazole 250 g/l EC*	G1	6 ml	112 ml	210 ml	7-14	21	
	Hexaconazole 50 g/l EC*	G1	6 ml	112 ml	210 ml	7-14	21	Last application should be done one week before flowering.
	Hexaconazole 50 g/l SC*	G1	6 ml	112 ml	210 ml	7-14	21	
	Tebuconazole 250 g/l EW*	G1	6 ml	112 ml	210 ml	7-10	21	Alternate application of systemic* fungicide with contact fungicide is recommended.
	Each above followed by Propineb 70% WP	M3	32 g	640 g	1200 g	7-10	14	
	Metiram 55% + Pyraclostrobin 5% WG*	M3+C3	32 g	640 g	1200 g	10-12	14	Maximum number of applications per season must be limited to three.
Anthracnose <i>Colletotrichum lindemuthianum</i>	Propiconazole 250 g/l EC*	G1	6 ml	112 ml	210 ml	7-14	21	Alternate application of systemic* fungicide with contact fungicide is recommended. Last application should be done one week before flowering.
	Hexaconazole 50 g/l EC*	G1	6 ml	112 ml	210 ml	7-14	21	
	Hexaconazole 50 g/l SC*	G1	6 ml	112 ml	210 ml	7-14	21	
	Tebuconazole 250 g/l EW*	G1	6 ml	112 ml	210 ml	7-14	21	
	Each above followed by Propineb 70% WP	M3	32 g	640 g	1200 g	7-10	14	
	Metiram 55%* + Pyraclostrobin 5% WG*	M3+C3	32 g	640 g	1200 g	10-12	14	Maximum number of applications per season must be limited to three.

Crop/Pest	Common name, Formulation Type & Strength	MOA	Dilution (Product/ 16 L of water)	Rate of Application (Product/ha) Depend on the size of the foliage		Application interval (days)	PHI (days)	Remarks
				Low	High			
Root rot <i>Fusarium spp.</i>	Thiram 80% WP	M3		70 g/50 l/10 m ²	-	6-8		
	Thiophanate-methyl 70% WP	B1		30 g/50 l/10 m ²	-	10-12		
	Thiophanate-methyl 50% + Thiram 30% WP	B1+M3	Soil drench	50 g/50 l/10 m ²	-	7-10		
	Flutolanil 50% WP	C2		30 g/50 l/10 m ²	-	10-12		
	Carbendazim 500 g/l SC	B1		35 ml/50 l/10 m ²	-	10-14		
04. CABBAGE								
Ring spot <i>Mycosphaerella brassicicola</i>	Propiconazole 250 g/l EC*	G1	6 ml	112 ml	210 ml	7-14	21	Apply to the entire foliage and repeat if necessary at three weeks intervals.
	Hexaconazole 50 g/l EC*	G1	6 ml	112 ml	210 ml	7-14	21	
	Hexaconazole 50 g/l SC*	G1	6 ml	112 ml	210 ml	7-14	21	
	Tebuconazole 250 g/l EW*	G1	6 ml	112 ml	210 ml	7-10	21	Strictly adhere to recommended rates to avoid phytotoxicity.
	Epoxiconazole 125 g/l SC*	G1	6 ml	112 ml	210 ml	7-14	21	
	Chlorothalonil 500 g/l SC*	M3	48 ml	960 ml	1800 ml	7-10	14	Alternate application of systemic* fungicide with contact fungicide is recommended.
Downy mildew <i>Peronospora parasitica</i>	Captan 50% WP	M3	32 g	640 g	1200 g	6-8	14	
	Mancozeb 75% WG	M3	32 g	640 g	1200 g	7-10	14	
	Mancozeb 80% WP	M3	32 g	640 g	1200 g	7-10	14	
	Maneb 80% WP	M3	32 g	640 g	1200 g	7-10	14	
Root rot <i>Fusarium spp.</i>	Tebuconazole 250 g/l EW	G1	6 ml	112 ml	210 ml	7-14	21	Spray in to the base of plant
	Thiophanate-methyl 50% + Thiram 30% WP	B1+M3	16 g	320 g	600 g	7-10	14	
	Captan 50% WP	M3	32 g	640 g	1200 g	6-8	14	
05. CARROT								
Alternaria blight <i>Alternaria spp.</i>	Mancozeb 75% WG	M3	32 g	640 g	1200 g	7-10	14	
	Mancozeb 80% WP	M3	32 g	640 g	1200 g	7-10	14	
	Maneb 80% WP	M3	32 g	640 g	1200 g	7-10	14	
	Propineb 70% WP	M3	32 g	640 g	1200 g	7-10	14	
	Chlorothalonil 500 g/l SC	M3	48 ml	960 ml	1800 ml	7-10	14	
	Chlorothalonil 75% WP	M3	32 g	660 g	1200 g	7-10	14	

Crop/Pest	Common name, Formulation Type & Strength	MOA	Dilution (Product/ 16 L of water)	Rate of Application (Product/ha) Depend on the size of the foliage		Application interval (days)	PHI (days)	Remarks
				Low	High			
Powdery mildew <i>Erysiphe</i> spp.	Chlorothalonil 500 g/l SC	M3	48 ml	960 ml	1800 ml	7-10	14	
	Chlorothalonil 75% WP	M3	32 g	640 g	800 g		14	
	Thiophanate-methyl 70% WP	B1	16 g	320 g	600 g	7- 14	21	
06. CHILLI/CAPSICUM/BELL PEPPER								
Foot rot/collar rot <i>Sclerotium rolfsii</i> <i>Fusarium solani</i>	Thiram 80% WP	M3		70 g/50 l/10 m ²		6-8	14	
	Thiophanate-methyl 70% WP	B1	Soil drench	30 g/50 l/10 m ²		10-12	14	Drench the soil as spot application at the appearance of symptoms.
	Thiophanate-methyl 50% + Thiram 30% WP	B1+M3		50 g/50 l/10 m ²		7-10	14	
Anthracnose <i>Colletotrichum</i> spp.	Thiophanate-methyl 70% WP*	B1	16 g	320 g	600 g	7-14	21	Alternate application of systemic* fungicide with contact fungicide is recommended.
	Metiram 55% + Pyraclostrobin 5% WG*	M3+ C3	32 g	640 g	1200 g	10-12	14	
	Fluazinam 500 g/l SC*	C5	16 ml	320 ml	600 ml	7-10	14	Maximum number of applications per season must be limited to three.
	Chlorothalonil 500 g/l SC	M3	48 ml	960 ml	1800 ml	7-10	14	
	Trifloxystrobin 25%* + Tebuconazole* 50% WG	C3+G1	10 g	192 g	360 g	10-12	21	
	Mancozeb 75% WG	M3	32 g	640 g	1200 g	7-10	14	
Blossom blight <i>Choanephora</i> spp.	Mancozeb 80% WG	M3	32 g	640 g	1200 g	7-10	14	
	Maneb 80% WP	M3	32 g	640 g	1200 g	7-10	14	
	Propineb 70% WP	M3	32 g	640 g	1200 g	7-10	14	
	Chlorothalonil 500 g/l SC	M3	48 ml	960 ml	1800 ml	7-10	14	
	Chlorothalonil 75% WP	M3	32 g	640 g	1200 g	7-10	14	
	Thiophanate-methyl 70% WP*	B1	16 g	320 g	600 g	7-14	21	
Powdery mildew <i>Laveillula taurica</i>	Chlorothalonil 500 g/l SC	M3	48 ml	960 ml	1800 ml	7-10	14	
	Chlorothalonil 75% WP	M3	32 g	640 g	1200 g	7-10	14	
	Mancozeb 75% WG	M3	32 g	640 g	1200 g	7-10	14	
Phytophthora blight <i>Phytophthora capsici</i>	Maneb 80% WP	M3	32 g	640 g	1200 g	7-10	14	
	Propineb 70% WP	M3	32 g	640 g	1200 g	7-10	14	
	Mancozeb 64% + Metalaxyl 8% WP*	M3+A1	20 g	400 g	750 g	12-14	14	
	Chlorothalonil 500 g/l SC	M3	48 ml	960 ml	1800 ml	7-10	14	

Crop/Pest	Common name, Formulation Type & Strength	MOA	Dilution (Product/ 16 L of water)	Rate of Application (Product/ha) Depend on the size of the foliage		Application interval (days)	PHI (days)	Remarks						
				Low	High									
07. COWPEA														
Ashy-stem blight														
<i>Macrophomina phaseolina</i>	Tebuconazole 250 g/l EW	G1	6 ml	112 ml	210 ml	14-21	21							
<i>Rhizoctonia</i> spp.														
08. CUCURBITS (SNAKE GOURD, BITTER GOURD, RIDGE GOURD, CUCUMBER & PUMPKIN)														
Downy mildew <i>Pseudoperonospora cubensis</i>	Mancozeb 64% + Metalaxyl 8% WP*	M3+A1	20 g	400 g	750 g	12-14	14							
	Metalaxyl-M 4% + Mancozeb 64% WG*	4 + M3	40 g	1200 g	1500 g	-	14							
	Metiram 55% + Pyraclostrobin 5% WG*	M3+C3	32 g	640 g	1200 g	10-12	14	Maximum number of applications per season must be limited to three						
	Propineb 70% WP	M3	32 g	640 g	1200 g	7-10	14	Alternate application of systemic* fungicide with contact fungicide is recommended.						
	Azoxystrobin 250 g/l SC*	C3	16 ml	320 ml	600 ml	10-12	14							
	Captan 50% WP	M3	32 g	640 g	1200 g	6-8	14							
	Captan 80% WG	M3	20 g	400 g	750 g	6-8	14							
	Mancozeb 60% + Dimethomorph 9% WP*	M3+40	80 g	1600 g			14							
	Chlorothalonil 500 g/l SC	M3	48 ml	960 ml	1800 ml	7-10	14							
	Chlorothalonil 75% WP	M3	32 g	640 g	1200 g	7-10	14							
Powdery mildew <i>Erysiphe</i> spp.	Flutriafol 250 g/l SC	G1	16 ml	320 ml	600 ml	10-12	14							
	Potassium bicarbonate 82% SP	-	24 g	480 g	900 g	7-10	01							
	Metiram 55% + Pyraclostrobin 5% WG*	M3+ C3	32 g	640 g	1200 g	10-12	14	Maximum number of applications per season must be limited to three.						
	Azoxystrobin 250 g/l SC*	C3	16 ml	320 ml	600 ml	10-12	14							
09. GROUND NUT														
Foot rot/Root rot <i>Sclerotium rolfsii</i> <i>Aspergillus niger</i> <i>Fusarium oxysporum</i>	Thiram 80% WP	M3		70 g/50 l/10 m ²		6-8	14							
	Thiophanate-methyl 70% WP	B1	Soil drench	30 g/50 l/10 m ²		10-12	14	Drench the soil as spot application at the appearance of symptoms						
	Thiophanate-methyl 50% + Thiram 30% WP	B1+M3		50 g/50 l/10 m ²		7-10	14							

Crop/Pest	Common name, Formulation Type & Strength	MOA	Dilution (Product/ 16 L of water)	Rate of Application (Product/ha) Depend on the size of the foliage		Application interval (days)	PHI (days)	Remarks
				Low	High			
10. ONION								
Bulb rot/Seedling blight <i>Fusarium</i> spp.	Captan 50% WP	M3	Bulb treatment					Immerse bulbs for 1 hr in fungicide solution just before planting. Thiophanate-methyl is highly effective on <i>Fusarium</i> spp. and <i>Sclerotium rolfsii</i> . Soil drenching in the field is recommended only as a spot application.
<i>Botrytis</i> spp.	Thiram 80% WP	M3		5 g/kg		-	-	
<i>Sclerotium</i> spp.	Thiophanate-methyl 50% + Thiram 30% WP	B1+M3	Seed treatment	5 g/kg				
<i>Pythium</i> spp.	Captan 50% WP	M4		3 g/kg				
<i>Phytophthora</i> spp.	Thiophanate-methyl 50% + Thiram 30% WP	B1+M3	Soil drench	50 g/50 l/10 m ²		7-10	14	
	Thiram 80% WP	M3		70 g/50 l/10 m ²		6-8	14	
Purple blotch								
<i>Alternaria porri</i>	Tebuconazole 250 g/l EW*	G1	6 ml	112 ml	210 ml	14-21	21	Alternate application of *systemic fungicide with contact fungicide is recommended.
	Trifloxystrobin 25% + Tebuconazole 50% WG*	C3+G1	10 g	192 g	360 g	10-12	21	
	Azoxystrobin 250 g/l SC*	C3	16 ml	320 ml	600 ml	10-12	14	
	Metiram 55% + Pyraclostrobin 5% WG*	M3+ C3	32 g	640 g	1200 g	10-12	14	
	Mancozeb 75% WG	M3	32 g	640 g	1200 g	7-10	14	
	Mancozeb 80% WP		32 g	640 g	1200 g	7-10	14	
	Maneb 80% WP	M3	32 g	640 g	1200 g	7-10	14	
	Propineb 70% WP	M3	32 g	640 g	1200 g	7-10	14	
	Chlorothalonil 500 g/l SC	M3	48 ml	960 ml	1800 ml	7-10	14	
	Chlorothalonil 75% WP	M3	32 g	640 g	1200 g	7-10	14	
	Fluazinam 500 g/l SC	M3	16 ml	320 ml	600 ml	7-10	14	

Crop/Pest	Common name, Formulation Type & Strength	MOA	Dilution (Product/ 16 L of water)	Rate of Application (Product/ha) Depend on the size of the foliage		Application interval (days)	PHI (days)	Remarks	
				Low	High				
Anthracnose <i>Colletotrichum gloeosporioides</i>	Thiophanate-methyl 70% WP*	B1	16 g	320 g	600 g	7-14	21	Alternate application of *systemic fungicide with contact fungicide is recommended.	
	Trifloxystrobin 25% + Tebuconazole 50% WG*	C3+G1	10 g	192 g	360 g	10-12	21	Maximum number of applications per season must be limited to three.	
	Azoxystrobin 250 g/l SC*	C3	16 ml	320 ml	600 ml	10-12	14		
	Metiram 55% + Pyraclostrobin 5% WG*	M3+ C3	32 g	640 g	1200 g	10-12	14		
	Mancozeb 75% WG	M3	32 g	640 g	1200 g	7-10	14		
	Mancozeb 80% WP	M3	32 g	640 g	1200 g	7-10	14		
	Chlorothalonil 500 g/l SC	M3	48 ml	960 ml	1800 ml	7-10	14		
	Chlorothalonil 75% WP	M3	32 g	640 g	1200 g	7-10	14		
	Fluzinam 500 g/l SC	M3	16 ml	320 ml	600 ml	7-10	14		
11. OKRA									
Powdery mildew <i>Erysiphe cichoracearum</i>	Sulphur 80% WG/WP	M3	80 g	1600 g	3000 g	6-8	14	Alternate application of *systemic fungicide with contact fungicide is recommended.	
	Carbendazim 50% WP*	B1	11 g	225 g	420 g	10-14	14	Maximum number of applications per season must be limited to three.	
	Carbendazim 500 g/l SC*	B1	11 ml	225 ml	420 ml	10-14	14		
12. LEEKS									
Purple blotch <i>Alternaria porri</i>	Tebuconazole 250 g/l EW*	G1	6 ml	112 ml	210 ml	14-21	21		
	Metiram 55% + Pyraclostrobin 5% WG*	M3+ C3	32 g	640 g	1200 g	10-12	14		
	Mancozeb 75% WG	M3	32 g	640 g	1200 g	7-10	14	Alternate application of *systemic fungicide with contact fungicide is recommended; Tebuconazole could be phytotoxic to Leeks Maximum number of applications per season must be limited to three.	
	Mancozeb 80% WP	M3	32 g	640 g	1200 g	7-10	14		
	Maneb 80% WP	M3	32 g	640 g	1200 g	7-10	14		
	Propineb 70% WP	M3	32 g	640 g	1200 g	7-10	14		
	Chlorothalonil 500 g/l SC	M3	48 ml	960 ml	1800 ml	7-10	14		
	Chlorothalonil 75% WP	M3	32 g	640 g	1200 g	7-10	14		
	Fluzinam 500 g/l SC	M3	16 ml	320 ml	600 ml	7-10	14		
13. POTATO (SEED TUBERS)									
Storage dry rot <i>Fusarium solani</i>	Thiophanate-methyl 70% WP	B1	Seed treatment	1000 g/mt		Mix with seed potatoes after harvest within 10 days before storage. Not recommended for table potato.			
	Thiophanate-methyl 50% + Thiram 30% WP	B1+M3		1000 g/mt					

Crop/Pest	Common name, Formulation Type & Strength	MOA	Dilution (Product/ 16 L of water)	Rate of Application (Product/ha) Depend on the size of the foliage		Application interval (days)	PHI (days)	Remarks
				Low	High			
14. POTATO AND TOMATO								
Early blight <i>Alternaria solani</i>	Mancozeb 75% WG	M3	32 g	640 g	1200 g	7-10	14	Alternate application of *systemic fungicide and contact fungicide is recommended. Start spraying after observing first symptoms. Maximum number of applications per season must be limited to three.
	Mancozeb 80% WP	M3	32 g	640 g	1200 g	7-10	14	
	Chlorothalonil 500 g/l SC	M3	48 ml	960 ml	1800 ml	7-10	14	
	Chlorothalonil 75% WP	M3	32 g	640 g	1200 g	7-10	14	
	Maneb 80% WP	M3	32 g	640 g	1200 g	7-10	14	
	Propineb 70% WP	M3	32 g	640 g	1200 g	7-10	14	
	Mancozeb 64% + Metalaxyl 8% WP*	M3+A1	40 g	800 g	1500 g	12-14	14	
	Metalaxyl-M 4% + Mancozeb 64% WG*	4 + M3	40 g	1200 g	1500 g	-	14	
	Captan 50% WP	M3	32 g	640 g	1200 g	6-8	14	
	Isoprothiolane 400 g/l EC*	F2	40 ml	800 ml	1500 ml	7-10	14	
	Mancozeb 60% + Dimethomorph 9% WP*	M3+F5	80 g	1600 g	3000 g	12-14	14	
	Metiram 55% + Pyraclostrobin 5% WG*	M3+ C3	32 g	640 g	1200 g	10-12	14	
Late blight <i>Phytophthora infestans</i>	Mancozeb 75% WG	M3	32 g	640 g	1200 g	7-10	14	Alternate application of *systemic fungicide with contact fungicide is recommended. Start spraying after observing first symptoms. Maximum number of applications per season must be limited to three.
	Mancozeb 80% WP		32 g	640 g	1200 g	7-10	14	
	Chlorothalonil 500 g/l SC	M3	48 ml	960 ml	1800 ml	7-10	14	
	Chlorothalonil 75% WP	M3	32 g	640 g	1200 g	7-10	14	
	Maneb 80% WP	M3	32 g	640 g	1200 g	7-10	14	
	Propineb 70% WP	M3	32 g	640 g	1200 g	7-10	14	
	Mancozeb 64% + Metalaxyl 8% WP*	M3+A1	50 g	800 g	1500 g	12-14	14	
	Metalaxyl-M 4% + Mancozeb 64% WG*	4 + M3	40 g	1200 g	1500 g	-	14	
	Propamocarb 607 g/l SL*	F4	48 ml	960 ml	1800 ml	7-10	14	
	Mancozeb 60% + Dimethomorph 9% WP*	M3+F5	80 g	1600 g	3000 g	12-14	14	
	Metiram 55% + Pyraclostrobin 5% WG*	M3+ C3	32 g	640 g	1200 g	10-12	14	
	Isoprothiolane 400 g/l EC*	F2	50 ml	800 ml	1500 ml	7-10	14	
	Fluazinam 500 g/l SC	C5	16 ml	320 ml	600 ml	7-10	14	
	Azoxystrobin 250 g/l SC*	C3	16 ml	320 ml	600 ml	10-12	14	

Fungicides

Pesticide Recommendations

Crop/Pest	Common name, Formulation Type & Strength	MOA	Dilution (Product/ 16 L of water)	Rate of Application (Product/ha) Depend on the size of the foliage		Application interval (days)	PHI (days)	Remarks
				Low	High			
Foot rot / Root rot <i>Rhizoctonia</i> spp. <i>Fusarium</i> spp.	Pencycuron 25% WP	B4	Soil drench	100 g/50 l/10 m ²		-	14	Drench soil as spot application at the appearance of symptoms.
	Thiram 80% WP	M3		70 g/50 l/10 m ²		6-8	14	
	Thiophanate-methyl 50% + Thiram 30% WP	B1+M3	Soil drench	50 g/50 l/10 m ²		7-10	14	Soil drenching in the field is recommended only as a spot application.
	Carbendazim 50% WP	B1		70 g/50 l/10 m ²		10-14	14	
15. TOMATO								
Leaf mold <i>Cladosporium fulvum</i>	Thiophanate-methyl 70% WP	B1	16 g	320 g	600 g	7-14	21	A common disease in Poly-tunnels.
	Chlorothalonil 500 g/l SC	M3	48 ml	960 ml	1800 ml	7-10	14	
	Chlorothalonil 75% WP	M3	32 g	640 g	1200 g	7-10	14	
LEAFY-VEGETABLE								
16. MUKUNUWENNA								
White rust <i>Albugo</i> spp. Red leaf spot <i>Cercospora</i> spp.	Chlorothalonil 500 g/l SC	M3	48 ml	960 ml	1800 ml	7-10	14	Alternate application of *systemic fungicide with contact fungicide is recommended.
	Mancozeb 75% WG	M3	32 g	640 g	1200 g	7-10	14	
	Mancozeb 80% WP	M3	32 g	640 g	1200 g	7-10	14	Start spraying after observing first symptoms.
	Azoxystrobin 250 g/l SC*	C3	16 ml	320 ml	600 ml	10-12	14	
17. GOTUKOLA								
Red leaf spot <i>Cercospora</i> spp.	Chlorothalonil 500 g/l SC	M3	48 ml	960 ml	1800 ml	7-10	14	Alternate application of *systemic fungicide with contact fungicide is recommended.
	Chlorothalonil 75% WP	M3	32 g	640 g	1200 g	7-10	14	
	Mancozeb 75% WG	M3	32 g	640 g	1200 g	7-10	14	
	Mancozeb 80% WP	M3	32 g	640 g	1200 g	7-10	14	Start spraying after observing first symptoms.
	Azoxystrobin 250 g/l SC*	C3	16 ml	320 ml	600 ml	10-12	14	
Root rot/collar rot <i>Sclerotium rolfsii</i> <i>Fusarium</i> spp.	Thiram 80% WP	M3		70 g/50 l/10 m ²		6-8	14	
	Thiophanate-methyl 70% WP	B1	Soil drench	30 g/50 l/10 m ²		10-12	14	Drench the soil as spot application at the appearance of symptoms.
	Thiophanate-methyl 50% + Thiram 30% WP	B1+M3		50 g/50 l/10 m ²		7-10	14	

Crop/Pest	Common name, Formulation Type & Strength	MOA	Dilution (Product/16 L of water)	Rate of Application (Product/ha) Depend on the size of the foliage		Application interval (days)	PHI (days)	Remarks						
				Low	High									
FRUIT CROPS														
18. APPLE AND PEAR														
Apple scab <i>Venturia inaequalis</i>	Tebuconazole 250 g/l EW*	G1	6 ml	112 ml	200 ml	14-21	21	Alternate application of *systemic fungicide with contact fungicide is recommended.						
Pear scab <i>Venturia pirina</i>	Followed by: Maneb 80% WP	M3	32 g	640 g	1200 g	7-10	14							
Pink disease <i>Nectria cinnabarina</i>														
19. AVOCADO														
Shoestring root rot <i>Armillaria mellea</i>	Copper (as Cupric Hydroxide) 37.5% WG	M3	Soil drench	250 g/50 l/10 m ²		6-8	14	Drench the soil around the plant at the appearance of symptoms.						
	Copper (as Copper Oxychloride) 50% WP	M3	64 g	200 g/50 l/10 m ²		6-8	14							
	Carbendazim 500 g/l SC	B1	Soil drench	35 ml/50 l/10 m ²		10-14	14							
	Carbendazim 50% WP*	B1	11 g	225 g	420 g	10-14	14							
20. BANANA														
Sigatoka leaf spot <i>Mycosphaerella musicola</i>	Chlorothalonil 500 g/l SC	M3	48 ml	960 ml	1800 ml	6-8	14	Fungicides are sprayed only during epidemic conditions.						
Cordana leaf spot <i>Cordana musae</i>	Chlorothalonil 75% WP	M3	32 g	640 g	1200 g	6-8	14							
	Mancozeb 75% WG	M3	32 g	640 g	1200 g	6-8	14							
	Mancozeb 80% WP	M3	32 g	640 g	1200 g	7-10	14							
	Carbendazim 50% WP*	B1	11 g	225 g	420 g	10-14	14							
	Carbendazim 500 g/l SC*	B1	11 ml	225 ml	420 ml	10-14	14							
	Tebuconazole 250 g/l EW*	G1	10 ml	192 ml	360 ml	10-14	21							
	Isoprothiolane 400 g/l EC*	F2	20 ml	400 ml	750 ml	7-10	14							
	Thiophanate-methyl 70% WP*	B1	16 g	320 g	600 g	10-14	21							
	Propiconazole 250 g/l EC*	G1	16 ml	320 ml	600 ml	10-14	14							
	Potassium bicarbonate 82% SP	-	24 g	480 g	900 g	7-10	01							
	Flutriafol 250 g/l SC*	G1	16 ml	320 ml	600 ml	10-12	14							
	Azoxystrobin 250 g/l SC*	C3	16 ml	320 ml	600 ml	10-12	21							

Crop/Pest	Common name, Formulation Type & Strength	MOA	Dilution (Product/ 16 L of water)	Rate of Application (Product/ha) Depend on the size of the foliage		Application interval (days)	PHI (days)	Remarks
				Low	High			
21. CITRUS								
Shoestring root rot <i>Armillaria mellea</i>	Copper (as Cupric Hydroxide) 37.5% WG	M3	Soil drench	250 g/50 l/10 m ²		6-8	14	Drench the soil around the plant at the appearance of symptoms.
	Copper (as Copper Oxychloride) 50% WP	M3	6 g	200 g/50 l/10 m ²		6-8	14	
Foot rot/Gummosis <i>Phytophthora parasitica</i>	Carbendazim 500 g/l SC	B1	Soil drench	35 ml/50 l/10 m ²		10-14	14	
	Carbendazim 50% WP*	B1	11 g	225 g	420 g	10-14	14	
	Mancozeb 64% + Metalaxyl 8% WP	M3+A1		150 g/50 l/10 m ²		12-14	14	
	Metalaxyl-M 4% + Mancozeb 64% WG*	4 + M3		150 g/50 l/10 m ²		12-14	14	
	Copper (as Cupric Hydroxide) 37.5% WG	M3	80 g	1600 g	3000 g	6-8	14	
Scab <i>Elsinoe fawcetti</i>	Tebuconazole 250 g/l EW*	G1	6 ml	200 ml	210 ml	14-21	21	Alternate application of *systemic fungicide with contact fungicide is recommended.
	Copper (as Cupric Hydroxide) 37.5% WG*	M3	80 g	1600 g	3000 g	6-8	14	
	Copper (as Copper Oxychloride) 50% WP	M3	6 g	200 g/50 l/10 m ²		6-8	14	
Powdery mildew <i>Oidium tingitanum</i>	Azoxystrobin 250 g/l SC*	C3	16 ml	320 ml	600 ml	10-12	14	
	Metiram 55% + Pyraclostrobin 5% WG*	M3+ C3	32 g	640 g	1200 g	10-12	14	
22. GRAPE								
Shoestring root rot <i>Armillaria mellea</i>	Copper (as Cupric Hydroxide) 37.5% WG	M3	Soil drench	250 g/50 l/10 m ²		6-8	14	Drench the soil around the plant at the appearance of symptoms.
	Copper (as Copper Oxychloride) 50% WP	M3	6 g	200 g/50 l/10 m ²		6-8	14	
	Carbendazim 500 g/l SC	B1	Soil drench	35 ml/50 l/10 m ²		10-14	14	
	Carbendazim 50% WP*	B1	11 g	225 g	420 g	10-14	14	

Pesticide Recommendations

Fungicides

Crop/Pest	Common name, Formulation Type & Strength	MOA	Dilution (Product/ 16 L of water)	Rate of Application (Product/ha) Depend on the size of the foliage		Application interval (days)	PHI (days)	Remarks
				Low	High			
Downy mildew <i>Peronospora viticola</i>	Mancozeb 64% + Metalaxyl 8% WP*	M3+A1	20 g	400 g	750 g	12-14	14	Alternate application of *systemic fungicide with contact fungicide is recommended. Maximum number of applications per season must be limited to three.
	Metalaxyl-M 4% + Mancozeb 64% WG*	4 + M3	40 g	1200 g	1500 g	-	14	
	Metiram 55% + Pyraclostrobin 5% WG*	M3+C3	32 g	640 g	1200 g	10-12	14	
	Propineb 70% WP	M3	32 g	640 g	1200 g	7-10	14	
	Azoxystrobin 250 g/l SC*	C3	16 ml	320 ml	600 ml	10-12	14	
23. GUAVA								
Fruit canker <i>Pestalotiopsis</i> spp.	Copper (as Cupric Hydroxide) 37.5% WG	M3	80 g	1600 g	3000 g	6-8	14	Alternate application of *systemic fungicide with contact fungicide is recommended. Maximum number of applications per season must be limited to three.
Anthracnose/Twig blight <i>Colletotrichum</i> spp.	Copper (as Cupric Hydroxide) 37.5% WG	M3	80 g	1600 g	3000 g	6-8	14	
<i>Gloeosporium</i> spp.	Hexaconazole 50 g/l EC*	G1	6 ml	112 ml	210 ml	7-14	21	
	Hexaconazole 50 g/l SC*	G1	6 ml	112 ml	210 ml	7-14	21	
	Tebuconazole 250 g/l EW*	G1	6 ml	112 ml	210 ml	7-10	21	
	Propineb 70% WP	M3	32 g	640 g	1200 g	7-10	14	
24. PAPAYA								
Root rot/ Stem rot <i>Phythium</i> spp.	Chlorothalonil 500 g/l SC	M3	Soil drench	90 ml/50 l/10 m ²	7-10	14	Drench around the base of the plant as spot application.	
<i>Phytophthora</i> spp.	Copper (as Cupric Hydroxide) 37.5% WG	M3	250 g/50 l/10 m ²	6-8	14			
	Copper (as Copper Oxychloride) 50% WP	M3	6 g	200 g/50 l/10 m ²	12-14	14		
	Mancozeb 64% + Metalaxyl 8% WP	M3+A1	150 g/50 l/10 m ²					
	Metalaxyl-M 4% + Mancozeb 64% WG*	4 + M3	150 g/50 l/10 m ²	12-14	14			
Leaf spot <i>Corynespora cassiicola</i>	Mancozeb 75% WG	M3	32 g	640 g	1200 g	6-8	14	
<i>Asperisporium caricae</i>	Mancozeb 80% WP		32 g	640 g	1200 g	7-10	14	
	Maneb 80% WP	M3	32 g	640 g	1200 g	6-8	14	

Crop/Pest	Common name, Formulation Type & Strength	MOA	Dilution (Product/ 16 L of water)	Rate of Application (Product/ha) Depend on the size of the foliage		Application interval (days)	PHI (days)	Remarks
				Low	High			
25. PINEAPPLE								
Heart/Stem/Root rot <i>Phytophthora</i> spp.	Copper (as Cupric Hydroxide) 37.5% WG	M3	Soil drench	250 g/50 l/10 m ²		6-8	14	Drench soil and plants with fungicide solution.
	Copper (as Copper Oxychloride) 50% WP	M3	6 g	200 g/50 l/10 m ²		6-8	14	
	Mancozeb 64% + Metalaxyl 8% WP	M3+A1	Soil drench	150 g/50 l/10 m ²		12-16	14	
	Metalaxyl-M 4% + Mancozeb 64% WG*	4 + M3		150 g/50 l/10 m ²		12-14	14	
26. POMEGRANATE								
Cercospora leaf/fruit spot <i>Cercospora punicae</i>	Mancozeb 75% WG	M3	32 g	640 g	1200 g	7-10	14	Prior to fungicide spraying, prune and clean the diseased plants.
	Mancozeb 80% WP	M3	32 g	640 g	1200 g	7-10	14	
	Chlorothalonil 500 g/l SC	M3	48 ml	950 ml	1800 ml	7-10	14	
	Chlorothalonil 75% WP	M3	32 g	640 g	1200 g	7-10	14	
	Thiophanate-methyl 70% WP*	B1	10 g	320 g	600 g	10-12	14	
Anthracnose <i>Colletotrichum gloeosporioides</i>	Mancozeb 75% WG	M3	32 g	640 g	1200 g	7-10	14	Prior to fungicide spraying, prune and clean the diseased plants.
	Thiophanate-methyl 70% WP*	B1	10 g	320 g	600 g	10-12	14	
	Carbendazim 50% WP*	B1	11 g	225 g	420 g	10-12	14	
	Carbendazim 500 g/l SC*	B1	11 ml	225 ml	420 ml	10-12	14	
27. RAMBUTAN								
Powdery mildew <i>Oidium</i> spp.	Sulphur 80% WG	M3	80 g	1600 g	3000 g	14-21	14	Repeat if necessary in 2 weeks.
	Thiophanate-methyl 70% WP	B1	16 g	320 g	600 g	10-12	14	
28. STRAWBERRY								
Gray mold <i>Botrytis cinerea</i>	Mancozeb 75% WG	M3	32 g	640 g	1200 g	7-10	14	Fungicide spraying must be started during flowering stage.
	Mancozeb 80% WP	M3	32 g	640 g	1200 g	7-10	14	
	Chlorothalonil 500 g/l SC	M3	48 ml	960 ml	1800 ml	7-10	14	
	Chlorothalonil 75% WP	M3	32 g	640 g	1200 g	7-10	14	
	Maneb 80% WP	M3	32 g	640 g	1200 g	7-10	14	

Crop/Pest	Common name, Formulation type & Strength	MOA	Dilution (Product/ 16 L of water)	Rate of Application (Product/ha) Depend on the size of the foliage		Application interval (days)	PHI (days)	Remarks
				Low	High			
Leaf spot <i>Mycosphaerella fragariae</i>	Tebuconazole 250 g/l EW*	G1	6 ml	112 ml	200 ml	14-21	21	Alternate application of *systemic fungicide with contact fungicide is recommended.
	Propineb 70% WP	M3	32 g	640 g	1200 g	7-10	14	
Leaf blight <i>Phomopsis obscurans</i> <i>Dendrophoma obscurans</i>	Tebuconazole 250 g/l EW*	G1	6 ml	112 ml	200 ml	14-21	21	
	Propineb 70% WP	M3	32 g	640 g	1200 g	7-10	14	
Anthracnose <i>Colletotrichum spp.</i>	Thiophanate-methyl 70% WP*	B1	16 g	192 g	360 g	10-12	14	
	Metiram 55% + Pyraclostrobin 5% WG*	M3+C3	32 g	640 g	1200 g	10-12	14	
	Propineb 70% WP	M3	32 g	640 g	1200 g	7-10	14	
	Azoxystrobin 250 g/l SC*	C3	16 ml	320 ml	600 ml	10-12	14	

FLORICULTURAL CROPS**29. ANTHURIUM, ORCHIDS, CHRYSANTHEMUM**

Anthracnose <i>Colletotrichum gloeosporioides</i> <i>Glomerella spp.</i>	Chlorothalonil 500 g/l SC	M3	48 ml	960 ml	1800 ml	7-10	-	
	Chlorothalonil 75% WP	M3	32 g	640 g	1200 g	7-10	-	
	Mancozeb 75% WG	M3	32 g	640 g	1200 g	7-10	-	Common in Anthurium, Aglaonema, Dieffenbachia, Adenium, Polyscias, Orchids and Dracaena.
	Mancozeb 80% WP	M3	32 g	640 g	1200 g	7-10	-	
	Carbendazim 50% WP	B1	11 g	220 g	420 g	10-14	-	
	Carbendazim 500 g/l SC	B1	11 ml	220 ml	420 ml	10-14	-	
	Maneb 80% WP	M3	32 g	640 g	1200 g	7-10	-	
	Thiophanate-methyl 70% WP	B1	16 g	320 g	600 g	10-12	-	
Rust <i>Puccinia spp.</i> <i>Uromyces spp.</i>	Chlorothalonil 500 g/l SC	M3	48 ml	960 ml	1800 ml	7-10	-	Common in Dracaena, Sandariana, Schefflera, Commelina, Aloe, Chrysanthemum and Canna.
	Chlorothalonil 75% WP	M3	32 g	640 g	1200 g	7-10	-	
	Mancozeb 75% WG	M3	32 g	640 g	1200 g	6-8	-	
	Mancozeb 80% WP	M3	32 g	640 g	1200 g	7-10	-	
	Tebuconazole 250 g/l EW	G1	6 ml	112 ml	210 ml	14-21	-	

Crop/Pest	Common name, Formulation type & Strength	MOA	Dilution (Product/ 16 L of water)	Rate of Application (Product/ha) Depend on the size of the foliage		Application interval (days)	PHI (days)	Remarks
				Low	High			
Leaf spots								
<i>Alternaria</i> spp.								
<i>Helminthosporium</i> spp.	Chlorothalonil 500 g/l SC	M3	48 ml	960 ml	1800 ml	7-10	-	Alternaria leaf spot is common in Aglaonema, Calathea, Schefflera and Fatsia. Leaf spot is common and major limiting factor in Palms (mainly in <i>Livistonia rotundifolia</i>), Cacti, Marantha and Calathea.
<i>Drechslera</i> spp.								
<i>Exserohilum</i> spp.								
<i>Phaetrioconis</i> spp.								
<i>Myrothecium</i> spp.	Chlorothalonil 75% WP	M3	32 g	1000 g	1200 g	7-10	-	<i>Myrothecium</i> leaf spot is common In Aglaonema, Dffenbachia, Dracaena, Hedera, Marantha, Peperomia and Philodendron. Ensure the proper sanitation along with fungicide application in heavy infection.
<i>Cercospora</i> spp.								
<i>Phyllosticta</i> spp.	Mancozeb 75% WG	M3	32 g	640 g	1200 g	7-10	-	
<i>Curvularia</i> spp.	Mancozeb 80% WP	M3	32 g	640 g	1200 g	7-10	-	
<i>Phomopsis</i> spp.	Maneb 80% WP	M3	32 g	640 g	1200 g	7-10	-	
<i>Cylindrocladium</i> spp.	Tebuconazole 250 g/l EW	G1	6 ml	112 ml	210 ml	14-21	-	

30. ANTHURIUM, DENDROBIUM DIEFFENBACHIA, DRACAENA, ROSES, ORCHIDS

Leaf spots Yellow blotch	Chlorothalonil 500 g/l SC	M3	48 ml	960 ml	1800 ml	7-10	-	
<i>Pseudocercospora dendrobi</i>	Chlorothalonil 75% WP	M3	32 g	1000 g	1200 g	7-10	-	
	Mancozeb 75% WG	M3	32 g	640 g	1200 g	7-10	-	
	Mancozeb 80% WP	M3	32 g	640 g	1200 g	7-10	-	Common in Dendrobium orchids.
	Carbendazim 50% WP	B1	11 g	220 g	420 g	10-14	-	
	Carbendazim 500 g/l SC	B1	11 ml	220 g	420 g	10-14	-	
	Maneb 80% WP	M3	32 g	640 g	1200 g	7-10	-	
	Thiophanate-methyl 70% WP	B1	16 g	320 g	600 g	10-12	-	
Damping off, Collar rot, Stem rot, Root rot and Crown rot	Captan 50% WP	M3		60 g/50 l/10 m ²		6-8	-	Anthurium, Dieffenbachia, Dracaena, Roses, Orchids and Peperomia are susceptible to <i>Phytophthora</i> spp. Scindapsus, Philodendron, Canna and Marantha are susceptible to <i>Phythium</i> spp. <i>Thiophanate-methyl</i> is more effective against <i>Fusarium</i> spp. and <i>Sclerotium rolfsii</i> .
	Thiram 80% WP	M3		70 g/50 l/10 m ²		6-8	-	
			Soil drench					
<i>Phytophthora</i> spp.	Thiophanate-methyl 70% WP	B1	drench	30 g/50 l/10 m ²		10-12	-	
<i>Phythium</i> spp.								
<i>Rhizoctonia</i> spp.								
<i>Sclerotium</i> spp.	Carbendazim 500 g/l SC	B1		35 ml/50 l/10 m ²		10-14	-	
<i>Botryodiplodia</i> spp.								
<i>Fusarium</i> spp.	Carbendazim 50% WP	B1	11 g	220 g	440 g	10-14	-	
Fusarium leaf spot	Thiophanate-methyl 70% WP	B1	16 g	320 g	600 g	10-12	-	Common in Dracaena, Acorus and Sansevieria.
<i>Fusarium moniliforme</i>								

Crop/Pest	Common name, Formulation Type & Strength	MOA	Dilution (Product/ 16 L of water)	Rate of Application (Product/ha) Depend on the size of the foliage		Application interval (days)	PHI (days)	Remarks
				Low	High			
Fusarium stem rot <i>Fusarium solani</i>	Captan 50% WP	M3	32 g	60 g/50 l/10 m ²	6-8	-		Aglaonema, Dieffenbachia and Polyscias are susceptible to stem rot.
Fusarium wilt <i>Fusarium oxysporum</i>								Fusarium wilt is common in Fatsia and Hedera species.
Stem and Rhizome rot <i>Aspergillus niger</i>	Captan 50% WP	M3	22 g	60 g/50 l/10 m ²	6-8	-	Dracaena, Polyscias and Sansevieria are susceptible to this disease.	
Thiram 80% WP	M3	Soil drench	70 g/50 l/10 m ²	70 g/50 l/10 m ²	6-8	-		
Chlorothalonil 500 g/l SC	Chlorothalonil 500 g/l SC	M3	32 g	90 ml/50 l/10 m ²	7-10	-	Dip the cut end of the cuttings and drench the soil with fungicide solution.	
Chlorothalonil 75% WP				1000 g	1200 g	7-10	-	

31. ROSES

Black spot <i>Diplocarpon rosae</i>	Maneb 80% WP	M3	32 g	640 g	1200 g	7-10	-	
	Chlorothalonil 500 g/l SC	M3	48 ml	960 ml	1800 ml	7-10	-	
	Chlorothalonil 75% WP	M3	32 g	1000 g	1200 g		14	
	Tebuconazole 250 g/l EW	G1	6 ml	120 ml	225 ml	14-21	-	
	Mancozeb 75% WG	M3	32 g	640 g	1200 g	7-10	-	
	Mancozeb 80% WP	M3	32 g	640 g	1200 g	7-10	14	
Botrytis blight <i>Botrytis cinerea</i>	Mancozeb 75% WG	M3	32 g	640 g	1200 g	7-10	-	
	Mancozeb 80% WP	M3	32 g	640 g	1200 g	7-10	14	
	Maneb 80% WP	M3	32 g	640 g	1200 g	7-10	-	
	Chlorothalonil 500 g/l SC	M3	48 ml	960 ml	1800 ml	7-10	-	
	Mancozeb 80% WG	M3	32 g	640 g	1200 g	7-10	14	
Downy mildew <i>Peronospora spp.</i>	Captan 50% WP	M3	32 g	640 g	1200 g	6-8	-	
	Metiram 55% + Pyraclostrobin 5% WG*	M3+C3	32 g	640 g	1200 g	10-12	-	
	Mancozeb 60% + Dimethomorph 9% WP*	M3+F5	80 g	1600 g	3000 g	12-14	-	
Powdery mildew <i>Sphaerotheca pannosa rosea</i>	Metiram 55% + Pyraclostrobin 5% WG*	M3+C3	32 g	640 g	1200 g	10-12	-	
	Thiophanate-methyl 70% WP	B1	10 g	320 g	600 g	10-12	-	

Crop/Pest	Common name, Formulation Type & Strength	MOA	Dilution (ml or g per 16L)	Rate of Application (Product ml or g/ ha) Low foliage High foliage	PHI Days	Remarks
32. TEA						
Blister blight <i>Exobasidium vexans</i>	Copper (Cuprous oxide) 50% WPe	M3	43 g	-	-	Apply for 30,000 nursery plants at the rate of 120 g/45 l and 4 day intervals if necessary
			42-53 ml	450 -560 g/170 l water	n/a	Fields not in plucking (Immature/pruned until tipping)
			26-40 g	280 - 420 g/170 l water	07	Plucking fields
	Copper(Copper hydroxide) 37.5% WP	M3	16 g		n/a	Apply for 30,000 nursery plants at the rate of 45 gg/45 l
			13-16 g	136 -170 g in 170 l water	n/a	Fields not in plucking (Immature/pruned until tipping)
			13-16 g	136 -170 g /170 l water	07	Plucking fields
Hexaconazole		G1	2 ml		n/a	Apply for 30,000 nursery plants at the rate of 25 ml /45 l
			8 ml	85 ml/170 l water	n/a	Fields not in plucking
Tebuconazole 250 g/l EW		G1			n/a	Apply for 30,000 nursery plants at the rate of 25 ml /45 l
				85 ml/170 l water	n/a	Fields not in plucking.
Propiconazole 250 g/l EC		G1	9	85 ml/170 l water	n/a	Apply for 30,000 nursery plants at the rate of 25 ml /45 l and fields not in plucking

Pesticide Recommendations

Fungicides

Crop/Pest	Common name, Formulation Type & Strength	MOA	Dilution (ml or g per 16L)	Rate of Application (Product ml or g/ ha) Low foliage High foliage	PHI Days	Remarks
Black blight <i>Rhizoctonia solani</i>	Copper (Cuprous oxide) 50% WP	M3	40 ml	425 g/ha/170 l	07	Mature Occasional. If rain continues, second spraying should be undertaken after 14 days
	Copper(Copper hydroxide) 57.6% WP					
Red Rust <i>Cephalouros parasiticus</i>	Copper(Cuprous oxide) 50% WP	M3	40 g	425 g/170 l	Occasional	For young tea, first spray in late April. Second spray in May. Third spray in June.
	Copper hydroxide	M3				
Red root disease <i>Poria hypolateritia</i>	Hexaconazole	G1	32 ml 0.1% solution	340 ml/170 l	Occasional & in Phichy areas	Apply 250 - 350 ml of solution per bush (It is necessary to rest the treated tea bushes without harvesting for 8 weeks)
Black root disease <i>Rosellinia arcuata</i>	Tebuconazole 250 g/l EW	G1	16 ml	170 ml/170 l		
White root disease <i>Ridgidoporus microporus</i>						
General Wood Rots on Prune Cuts	Tar acid 9-12%		15 % solution (1.5 l of Brunolium in 8.5 l of water)		n/a	Add a colour (blue or red) for identification purposes.
						Paint/spray on to individual prune cuts 2-3 days from 2 nd pruning onwards 7-8 l per hectare

Crop/Pest	Common name, Formulation Type & Strength	MOA Group	Dilution (ml or g per 16L)	Rate of Application (Product ml or g/ha)	Application interval (days)	Remarks
33. COCONUT						
DISEASES						
Bud Rot Disease <i>Phytophthora palmivora</i>	Mancozeb 64% + Metalaxyl 8% WP	M3 +A1	64 g			Drench the bud region with a 11 of 4g/l solution
Leaf Spot/Blight <i>Pestalotiopsis palmarum</i>	Tebuconazole 250 g/l EW	G1	64 ml		once in 2-3 weeks	
Stem Bleeding Disease <i>Bipolaris incurvata</i>	Copper (Copper Oxychloride) 50% WP	M3	300 g			PPLY 1% fungicide after removal of affected region and apply coal tar or burnt engine oil after 2 days
	Copper (Cupric Hydroxide) 37.5% WG	M3	320 g			
Seedling Leaf Dieback <i>Curvularia lunata</i>	Tebuconazole 250 g/l EW	G1	4 ml			
34. CINNAMON						
Rough bark disease <i>Phomopsis spp.</i>	Tebuconazole 250 g/l EW Hexaconazole 50 g/l EC	G1 G1	8 ml 32 ml	450 ml 400 ml	60 day	Initial stage of the damage (more effective). 3 months interval after selective pruning or harvesting. It is need to practice other good agricultural practices simultaneously
Leaf blight <i>Colletotrichum gloeosporioides</i>	Tebuconazole 250 g/l EW Hexaconazole 50 g/l EC	G1 G1	8 ml 32 ml	450 ml 400 ml	60 day	Initial stage of the damage (more effective). Thrice at two weeks interval. It is only recommended in nursery & less than 3 years aged plants
White root disease <i>Rigidoporus microporus</i>	Sulphur 80% WP/WG Tebuconazole 250 g/l EW Hexaconazole 50 g/l EC	M2 G1 G1	80 g 16 ml 32 ml	4500 g 900 ml 1800 ml	60 day	Initial stage of the damage (more effective). Twice at 2 weeks interval. It is need to practice other good agricultural practices simultaneously
Brown root rot disease <i>Phellinus noxius</i>	Sulphur 80% WP/WG Tebuconazole 250 g/l EW Hexaconazole 50 g/l EC	M2 G1 G1	80 g 16 ml 32 ml	4500 g 900 ml 1800 ml	60 day	Initial stage of the damage (more effective). Twice at 2 weeks interval. It is need to practice other good agricultural practices simultaneously

Crop/Pest	Common name, Formulation Type & Strength	MOA Group	Dilution (ml or g per 16L)	Rate of Application (Product ml or g/ha)	Application interval (days)	Remarks
35. BLACK PEPPER						
Quick Wilt disease <i>Phytophthora capsici</i>	Mancozeb 64% + Metalaxyol 8% 72% MZ	MO3 + A1	40 g	10 g per vine as soil drench	14 days	Immediately after observing the symptoms. Remove all the affected parts from the field is very important before apply the fungicides
Slow wilt <i>Pythium</i> spp. <i>Fusarium</i> spp. <i>Rhizoctonia</i> spp.	Copper oxichloride 50% WP or Cupric hydroxide 37.5% WP Copper (Copper Oxychloride) 50% WP	M3 M3	64 g 64 g	16 g per vine as soil drench 200 g/50 l/10 m ²	14 days	After observing the symptoms (initial stage is more effective). 2 nd application is only if required
36. CLOVE						
Leaf fall disease (leaf spot & leaf blight) <i>Cylindrocladium</i> spp.	Carbendazim 50% WP Thiophanate-methyl 70% WP	B1 B1	11 g 10 g	320 g	14 days	3.5 g per tree as foliar application 3 g per tree as foliar application. When observing the leaf blight symptoms and leaf fall (initial stage is more effective). It is need to practice other good agricultural practices simultaneously
37. COCOA						
Die-back disease <i>Lasiodiplodia theobromae</i>	Carbendazim 50% WP	B1	11 g	3.5 g per tree as foliar application	14	When symptoms are appeared (initial stage is more effective). 14 days (2-3 times). It is need to practice other good agricultural practices simultaneously
38. GINGER						
Soft rot disease <i>Pythium</i> spp.	Mancozeb 75% WG	M3	60 g	38 g per 40 ft ² bed as soil drench	14	When symptoms are appeared (initial stage is more effective). 14 days (2 times). Fungicide application should be done only infected beds and surrounding beds

Fungicides

Pesticide Recommendations

Crop/Pest	Common name, Formulation Type & Strength	MOA	Dilution (ml or g per 16L)	Rate of Application (Product ml or g/ha)	Application interval (days)	Remarks
Leaf spot <i>Phylosticta zingiberi</i>	Captan 50% WP	M3	Soil drench	60 g/50 l/10 m ²	14	6-8
	Thiram 80% WP	M3	Soil drench	70 g/50 l/10 m ²	-	6-8
	Mancozeb 80% WP	M3	40 g	500 g per ha as foliar application		When symptoms are appeared. (initial stage is more effective).
	Mancozeb 75% WG	M3				With rain droplets spores are spread therefore, it is important to apply fungicides before starting rainy season.

39. TURMERIC

Leaf blotch <i>Taphrina maculans</i>	Mancozeb 80% WP	MO3	60 g	760 g/ha as foliar application		When symptoms are appeared (initial stage is more effective). Fungicide application is recom- mended only the disease condi- tion is severe
Rhizome rot <i>Pythium spp.</i>	Mancozeb 80% WP	MO3	60 g	38 g per 40 ft ² bed as soil drench		Fungicide application should be done only infected beds and surrounding beds
Leaf blight disease <i>Curvularia spp.</i>	Mancozeb 80% WP	MO3	48 g	12 g per tree as foliar 800 g		When symptoms are appeared (initial stage is more effective). 14 days (2 times). Fungicide application should be done only infected beds and surrounding beds

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2nd application is only if required

Pesticide Recommendations

Fungicides

Crop/Pest	Common name, Formulation Type & Strength	MOA	Dilution (ml or g per 16L)	Rate of Application (Product ml or g/ha)	Application interval (days)	Remarks
Leaf fall disease <i>Colletotrichum gloeosporioides</i> <i>Neofusicoccum</i> spp.	Copper oxychloride 50% WP Tebuconazole 250 g/l EW	MO1 G1	64 g 1:1 ratio	40 g per tree as foliar application 7.5 ml per tree as trunk treatment		When New flush emergence. 14 days (3-4 times). It is need to practice other good agricultural practices simultaneously
White root disease <i>Rigidoporus microporus</i>	Tebuconazole 250 g/l EW	G1	160 ml	100 ml per tree as soil drench		After observing the symptoms (initial stage is more effective). 90-120 day (two times). 3 rd application is only if required It is need to practice other good agricultural practices simultaneously

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HERBICIDES

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Peradeniya
2019

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Crop(s)	Common name, Formulation Type & Strength	MOA	Dilution (Product/ 16 L of water)	Rate of Application (Product ml or g/ha)	Times of Application	Remarks
01. NON-CROP LAND : PRE-PLANTING TOTAL WEED CONTROL						
Herbaceous weeds Annual weeds	Glufosinate ammonium 280 g/l SL	H	80 ml	1600 ml	BLP	Apply thoroughly to wet the green foliage when weeds are at active growing stage. 4-6 hrs of sunny weather is required after application for effective absorption of the herbicide. Do not till the land before 12 - 14 days after application
	Glufosinate ammonium 150 g/l SL	H	80 ml	1600 ml	BLP	
	Tiafenacil 5% ME	E	100 ml	2500 ml	BLP	
02. POST- PLANTING HERBICIDES FOR GRASSES, SEDGES & BROAD-LEAF WEEDS						
RICE						
Common annual grasses, sedges & broad-leaf weeds	Pretilachlor 300 g/l EC	K3	64 ml	1600 ml	0-4 DAS/DAP	Apply on to wet/moist soil. Proper land levelling is important. Maintains soil moisture for 2-3 weeks.
<i>Echinochloa</i> spp.	Oxyfluorfen 480 g/l EC	E	10 ml	250 ml	0-4 DAS/DAP	Broadcasted rice only. Apply on to wet/moist soil before opening the 1 st leaf of rice plants.
<i>Ischaemum rugosum</i>						Proper land levelling is important. Maintain soil moisture for 2-3 weeks.
<i>Leptochloa chinensis</i>						
<i>Cyperus difformis</i>	Oxyfluorfen 240 g/l EC	E	20 ml	500 ml	3-5 DAS	
<i>Cyperus iria</i>	Pretilachlor 300 g/l + Pyribenzoxim 20 g/l EC	K3 + B	50 ml	1250 ml	6-10 DAS/DAP	Apply on to wet soil.
<i>Fimbristylis</i> spp.						
<i>Ludwigia</i> spp.	Pretilachlor 170 g/l + Propanil 330 g/l EC	K3 + C2	80 ml	2000 ml	7-12 DAS	Apply on to wet/moist soil. Proper land levelling is important. Maintains soil moisture for 2-3 weeks.
<i>Eclipta alba</i>						
<i>Monochoria vaginalis</i>						
<i>Commelina diffusa</i>	Florpyrauxifen-benzyl 25 g/l EC	O	60 ml	1200 ml	7-12 DAS	Drain thoroughly to expose weeds. Impound water after 2-3 days of spraying. Do not apply for varieties Bg 360, Bg 366, Bg 403, Bg 379/2, Bg 359, Bg 374, Bg 406
	Triafamone 200 g/l SC	B	6 ml	150 ml	7-12 DAS/DAP	Drain thoroughly to expose weeds. Impound water after 2-3 days of spraying.

*DAS = Days After Sowing

* DAP = Days After Planting

DBS = Days Before Sowing

BLP = Before Land Preparation

Number of rice leaves ; 0 - 5 DAS - 0 - 2 leaves, 7 - 12 DAS - 2 - 3 leaves, 7-15 DAS - 2-5 leaves, 8 - 15 DAS - 2-5 leaves, 16 - 18 DAS - 3-6 leaves

Crop(s)	Common name, Formulation Type & Strength	MOA	Dilution (Product/ 16 L of water)	Rate of Application (Product ml or g/ha)	Times of Application	Remarks
Common annual grasses, sedges & broad-leaf weeds including <i>Echinochloa</i> spp. <i>Ischaemum rugosum</i> <i>Leptochloa chinensis</i> <i>Cyperus difformis</i> <i>Cyperus iria</i> <i>Fimbristylis</i> spp. <i>Ludwigia</i> spp. <i>Eclipta alba</i> <i>Monochoria vaginalis</i> <i>Commelina diffusa</i>	Bispyribac-sodium 15 g/l + Thiobencarb 900 g/l OD Azimsulfuron 50% WG Pyribenzoxim 50 g/l EC Bispyribac-sodium 100 g/l SC Bispyribac-sodium 20% WP Bispyribac sodium 40 g/l+ Metamifop 100 g/l SC Flucetosulfuron 10% WG Propyrisulfuron 10% SC Propanil 60% + MCPA 7.5% DF Propanil 200 g/l EC + Thiobencarb 400 g/l Cyhalofop Butyl + Pyribenzoxim 8.5% EC Pyrazosulfuron-ethyl 0.75% + Pretilachlor 30% DF Fenoxyaprop-p-ethyl 69 g/l + Ethoxysulfuron 20 g/l OD	B + N B B B B B+A B B C2+O C2+N A+B B+K3 A+B	60 ml 2.4 g 20 ml 12 ml 12 g 25 ml 8 g 20 ml 90 g 140 ml 50 ml 88 g 20 ml	1500 ml 60 g 500 ml 300 ml 300 g 625 ml 200 g 500 ml 2250 g 3500 ml 1250 ml 1750 g 500 ml	7-14 DAS/DAP 7-15 DAS/DAP 7-18 DAS/DAP 8-14 DAS/DAP 8-14 DAS/DAP 8-14 DAS/DAP 8-14 DAS/DAP 8-14 DAS/DAP 10-12 DAS/DAP 10-12 DAS 10-14 DAS/DAP 14-21 DAS 14-21 DAS	Drain thoroughly to expose weeds. At the rate of 10-15 ml/16 l of spray mixture. Impound water 2-3 days after spraying. Apply on to drained wet soil. Impound water 2-3 days after spraying. Drain thoroughly to expose weeds. Always mix with the non-ionic surfactant at the rate of 10-15 ml/16 l of spray mixture. Impound water 2-3 days after spraying. Apply on to drained wet soil. Impound water 2-3 days after spraying. Apply on to drained wet soil. Impound water 2-3 days after spraying. Apply on to drained wet soil. Impound water 2-3 days after spraying. Apply on to drained wet soil. Impound water 2-3 days after spraying. Apply on to drained wet soil. Impound water 2-3 days after spraying. Propanil based products are prohibited for use in the districts of Anuradapura, Kurunegala, Polonnaruwa, Monaragala and DS divisions of Maiyanganaya, Ridimaliyaddha, Kandeketiya in Badulla district Drained wet soil. Impound water 2-3 days of after spraying. Maintain soil moisture condition for 2-3 weeks. Apply on to drained wet soil. Impound water 2-3 days after spraying.

*DAS = Days After Sowing

* DAP = Days After Planting

* DBS = Days Before Sowing

* BLP = Before Land Preparation

Number of leaves of rice plant ; 0 - 2 (0 - 5 DAS), 2 - 3 (7 - 12 DAS), 2 - 5 (7-15 DAS), 8 - 15 DAS - 2-5 leaves, 16 - 18 DAS - 3-6 leaves

Crop(s)	Common name, Formulation Type & Strength	MOA	Dilution (Product/ 16 L of water)	Rate of Application (Product ml or g/ha)	Times of Application	Remarks
RICE						
POST-PLANTING SELECTIVE WEED CONTROL – (GRASS KILLERS)						
Mainly annual grasses including <i>Echinochloa</i> spp. <i>Ischaemum rugosum</i> <i>Leptochloa chinensis</i>	Cyhalofop-butyl 100 g/l EC Metamifop 100 g/l EC Quinclorac 250 g/l SC Clomazone 200 g/l + Propanil 400 g/l EC Fenoxaprop-p-ethyl 75 g/l EW Profoxydim 75 g/l EC	A A O F4+ C2 A A	80 ml 50 ml 32 ml 100 ml 14 ml 40 ml	2000 ml 1250 ml 800 ml 2500 ml 350 ml 1000 ml	7-15 DAS/DAP 8-12 DAS/DAP 8-15 DAS/DAP 8-15 DAS/DAP 16-25 DAS/DAP 20 - 25 DAS	Apply on to wet soil or with little standing water. Apply on to drained fields Apply on to wet soil. Irrigate 1-3 days after application. Do not apply if succeeding crop belongs to Solanaceae family. Apply on to moist soil. Impound water 2-3 days after spraying. Propanil based products are prohibited for use in the districts of Anuradapura, Kurunegala, Polonnaruwa, Monaragala and DS divisions of Maiyanganaya, Ridimaliyaddha, Kandeketiya in Badulla district Drain the field thoroughly to expose weeds. Impound water 2-3 days after spraying. Apply on to drained wet soil. Impound water 2-3 days after spraying.
RICE						
POST-PLANTING SELECTIVE WEED CONTROL (BROAD LEAVES & SEDGES)						
Annual broad-leaf weeds and sedges Including <i>Cyperus difformis</i> <i>Cyperus iria</i> <i>Fimbristylis</i> spp. <i>Eclipta alba</i> <i>Ludwigia</i> spp. <i>Monochoria vaginalis</i> <i>Commelina diffusa</i>	Pyrazosulfuron-ethyl 10% WP Propanil 230 + Oxadiazon 80 g/l EC Bensulfuron-methyl 8.25% + Metsulfuron-methyl 1.75% WP Bentazon 480 g/l SL Penoxulam 240 g/l SL Carfentrazone-ethyl 240 g/l EC Carfentrazone-ethyl 40% WDG Orthosulfamuron 50% WG MCPP 600 g/l SL	B C2+E B + B B B E B O	5.62 g 140 ml 10 g 100 ml 4 ml 4.8 ml 4 g 6 g 72 ml	112.5 g 3500 ml/ha 250 g 2500 ml 100 ml 120 ml 90 g 150 g 1800 ml	7-21 DAS/DAP 7-12 DAS/DAP 12-21 DAS/DAP 12-18 DAS 10-18 DAS/DAP 14-21 DAS/DAP 15-18 DAS/DAP 18-21 DAS/DAP	Apply on to drained wet soil. Impound water 2-3 days after spraying.

*DAS = Days After Sowing

* DAP = Days After Planting

DBS = Days Before Sowing

BLP = Before Land Preparation

Number of rice leaves ; 0 - 5 DAS - 0 - 2 leaves, 7 - 12 DAS - 2 - 3 leaves, 7-15 DAS - 2-5 leaves, 8 - 15 DAS - 2-5 leaves, 16 - 18 DAS - 3-6 leaves

Crop(s)	Common name, Formulation Type & Strength	MOA	Dilution (Product/ 16 L of water)	Rate of Application (Product ml or g/ha)	Times of Application	Remarks
03. PRE-PLANTING SELECTIVE WEED CONTROL (WEEDY-RICE)						
<i>Oryza sativa</i>	Pretilachlor 300 g/l EC	K3	64 ml	1600 ml	DBS	Apply on to wet moisture soil, 3 days before seeding of rice
04. SOYBEAN, BLACK GRAM, GREEN GRAM & COWPEA						
Common weeds including <i>Digitaria sanguinalis</i> <i>Echinochloa</i> spp. <i>Eleusine indica</i> <i>Lolium</i> spp., <i>Cleome</i> spp. <i>Portulaca oleracea</i> <i>Ageratum conizoides</i> <i>Digitaria</i> spp.	Metribuzin 70% WP Metribuzin 70% WG Imazethapyr 10% SC	C1 C1 B	40 g 40 g 32 ml	1000 g 1000 g 600 ml	0-3 DAS 0-3 DAS 0-3 DAS	Apply after seeding Apply at 2-3 leaves stage of weeds
05. BIG ONION & RED ONION						
Annual grasses, Sedges and Broad- leaves weeds,	Oxyfluorfen 240 g/l EC Pendimethalin 300 g/l EC Oxyfluorfen 480 g/l EC	E K1 E	20 ml 140 ml 10 ml	500 ml 3500 ml 250 ml	2-12 DAP 0-5 DAP 2-12 DAP	Apply on to leveled field with adequate soil moisture for effective results.
06. MAIZE						
Annual grasses, Broad leaves and Sedges <i>Sida acuta</i> <i>Amaranthus</i> spp. <i>Cleome</i> spp. <i>Digitaria</i> spp. <i>Echinochloa</i> spp. <i>Setaria</i> spp. <i>Eleusine indica</i>	Pendimethalin 300 g/l EC	K1	140 ml	3500 ml	0 - 5 DAS/DAP	Apply on to field with adequate soil moisture is for effective results.

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DBS = Days Before Sowing

BLP = Before Land Preparation

Herbicides

Pesticide Recommendations

Crop(s)	Common name, Formulation Type & Strength	MOA	Dilution (Product/ 16 L of water)	Rate of Application (Product ml or g/ha)	Times of Application	Remarks
	Topramezone 336 g/l SC	F2	4 ml	100 ml	10-15 DAS	Apply at 2-3 leaves stage of weeds
	Nicosulfuron 40 g/l OD	B	50 ml	1250 ml	10-15 DAP	Apply on to field with adequate soil moisture for effective results.
Post emergent herbicide to control sedges in Maize	Halosulfuron-methyl 75% WG	B	2 g	60 g		Apply when crop is around 2-3 weeks old.

07. POTATO

Common weeds including

Digitaria sanguinalis

Eleusine indica,

Lolium spp.

Galinsoga parviflora,

Amaranthus spp.

Polygonum spp.

Portulaca oleracea

Solanum nigrum

Metribuzin 70% WP
Metribuzin 70% WG

C1
C1

40 g
40 g

1-6 DAP

Apply leveled field with adequate soil moisture is required for effective results.

08. CARROT

Common weeds including

Digitaria sanguinalis

Echinochloa spp.

Eleusine indica,

Lolium spp.

Amaranthus spp.

Portulaca oleracea

Solanum nigrum

Galinsoga parviflora

Polygonum spp.

Metribuzin 70% WP
Metribuzin 70% WG

C1
C1

20 g
20 g

3 DAS

Sufficient soil moisture will improve the efficacy of weed control.

*DAS = Days After Sowing

* DAP = Days After Planting

DBS = Days Before Sowing

BLP = Before Land Preparation

Crop(s)	Common name, Formulation Type & Strength	MOA	Dilution (Product/ 16 L of water)	Rate of Application (Product ml or g/ha)	Times of Application	Remarks
09. PINEAPPLE						
All herbaceous weeds	Diuron 80% WP	C2	128 g	3200 g	Pre-emergence & early post-emergence	
Herbaceous weeds	Diuron 500 g/l SC	C2	72 ml	1800 ml	Pre-emergence & early post-emergence	
10. TEA						
All Herbaceous weeds	Glyphosate (as iso-propyl-amine salt) 360 g/l SL	G	80 ml	1700 ml	post-emergence	Restricted use in tea. Apply thoroughly to wet green foliage when weeds are at active growing stage. 4-6 hrs of sunny weather is required after application for effective absorption of the herbicide.
	Oxyfluorfen 240 g/l EC	E	35 ml	1200 ml	Pre-emergence & early post-emergence	Apply on to bare moist soil. Fields not in plucking (New clearing/pruned until 500 l of mixture sufficient for a hectare)
	Oxyfluorfen 480 g/l EC	E	21 ml	700 ml		
	Diuron 80% WP	C2	35 g	1200 g	Pre-emergence & early post-emergence	Apply on to bare moist soil only (as a pre-emergent weedicide). On plucking fields (Mature fields/after the first prune) 500 l of mixture sufficient for a hectare
	Diuron 500 g/l SC	C2	43 ml	1500 ml	Pre-emergence & early post-emergence	
<i>Panicum repens</i> <i>Imperata cylindrica</i>	Glyphosate 360 g/l SL*	G	40 ml	-		Plucking stage tender leaves.
	Glyphosate 360 g/l SL*	G	80 ml	-		Mature stage tender leaves.
	Glyphosate 360 g/l SL*	G	320 ml	-		Harddy weeds

Crop(s)	Common name, Formulation Type & Strength	MOA	Dilution (Product/ 16 L of water)	Rate of Application (Product ml or g/ha)	Times of Application	Remarks
11. SUGARCANE						
All Herbaceous weeds	Diuron 80% WP	C2	120 g	3000-4000 g	Pre-emergence & early post-emergence	Spray volume: 400 l/ha
	Oxfluorfen 240 g/l EC	E	40 ml	1000-2000 ml	Pre-emergence & early post-emergence	Apply on moist soil for effective weed control
	Ametryn 73.1% + Trifloxy-sulfuron 1.85% WG	B + C1	80 g	2000-4000 g	Pre-emergence & early post-emergence	Selective to young sugarcane plants. (Spray selective on: 400 l/ha)
	Metribuzin 70% WG	C1	80 g	2000-2500 g	Pre-emergence & early post-emergence	Selective on young sugarcane plants. Apply on moist soil for effective weed control.
12. RUBBER						
All Herbaceous weeds	Diuron 80% WP	C2	160 g	4000 g	Pre-emergence & early post-emergence to time of application	Apply thoroughly to wet green foliage when weeds are at active growing stage. 4-6 hrs of sunny weather is required after application for effective absorption of the herbicide. (Spray volume: 400 l/ha)
	Glyphosate (as iso-propyl-amine salt) 360 g/l SL	G	200 ml	6000 ml		

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Mode of Action (MOA) Classification of insecticides: Ref IRAC 2019

No	MOA Class	Primary Cite of Action in Insectisides	Active Ingredients
01.	Acetylcholinesterase (AChE) inhibitors - Nerve action	1A - Carbamates 1B - Organophosphates	Carbosulfan, Fenobucarb Diazinon, Pirimiphos-methyl, Profenofos, Quinalphos, Acephate
02.	GABA-gated chloride channel antagonists - Nerve action	2A - Cyclodines 2B - Phenyl Pyrazoles	Fipronil
03.	Sodium channel modulators - Nerve action	3A - Pyrethroids 3B - Methoxy chlor; DDT	Etofenprox Lambda- cyhalothrin, Esfenvalerate, Deltamethrin, Premethrin, Bifenthrin
04.	Nicotinic acetylcholine receptor (nAChR) agonists - Nerve action	4A - Nicotinoids 4B - Nicotine 4C - Sulfoxaflor	Thiamethoxam, Imidacloprid, Acetamiprid, Thiacloprid Sulfoxaflor
05.	Nicotinic acetylcholine receptor (nAChR) allosteric activators - Nerve action	5 Spinosyns	Spinosad, Spinotoram
06.	Chloride channel activators - Nerve and muscle action	6 Avermectins, Milbemycin	Abamectin, Emamectin- benzoate
07.	Juvenile hormone mimics - Growth regulation	-	-
08.	Miscellaneous nonspecific (multi-site) inhibitors	-	-
09.	Modulators of chordotonal organs - Nerve action	9B - Pymetrozine	Pymetrozine
10.	Mite growth inhibitors - Growth regulation	10A - Clofentezin Diflovidazin Hexythiazox	Hexythiazox
11.	Microbial disruptors of insect midgut membranes	-	-
12.	Inhibitors of mitochondrial ATP synthase - Energy metabolism	-	-
13.	Uncouplers of oxidative phosphorylation via disruption of the proton gradient - Energy metabolism	-	-
14.	Nicotinic acetylcholine receptor (nAChR) channel blockers	Nereistoxin analogues	Thiocyclam, Thiocyclam (Hydrogen Oxalate)
15.	Inhibitors of chitin biosynthesis - type 0 Growth regulation	Benzoylureas	Chlorfluazuron, Novaluron, Bistrifluron Lufenuron, Acetamiprid
16.	Inhibitors of chitin biosynthesis - type 1 Growth regulation	Buprofezin	Buprofezin

No	MOA Class	Primary Cite of Action in Insecticides	Active Ingredients
17.	Moultung disruptor, Dipteran - Growth regulation		
18.	Ecdysone receptor agonists - Growth regulation		Tebufenozide, Methoxyfenozide, Chromafenozi
19.	Octopamine receptor agonists - Nerve action		
20.	Mitochondrial complex III electron transport inhibitors - Energy metabolism		
21.	Mitochondrial complex I electron transport inhibitors - Energy metabolism	21A	Fenpyroximate
22.	Voltage-dependent sodium channel blockers - Nerve action	22B	Indoxacarb Metaflumizone
23.	Inhibitors of acetyl CoA carboxylase. Lipid synthesis - Growth regulation		
24.	Mitochondrial complex IV electron transport inhibitors - Energy metabolism		
25.	Mitochondrial complex II electron transport inhibitors - Energy metabolism		
26./27.		Un assigned	
28.	Ryanodine receptor modulators - Nerve and muscle action		Flubendiamide Chlorantraniliprole
UN	Compounds of unknown or uncertain Mode of Action	Azadirachtin Lime sulphur	Azadirachtin-A Sulphur

Registered Insecticide List with Trade Names - 2019

No	Common Name	Strength	Product Name
01.	Abamectin	18 g/l EC	Mitsu Abamectin, Selico Abamectin, CIC Abamectin, Aba Abamectin, CG Abamectin, ICS Abamectin, Baurs Abamectin, Narita Abamectin, ZagroAbamectin, Zoro Abamectin, Mightee Abamectin, Mig Abamectin Agstar Abamectin, Ceypetco Abamectine, Akito Abamectin, Amber abamectin
02.	Acephate	75 g/l SC	Harthene Acephate, Action Acephate, Nigro Acephate, Surrender Acephate, Oasis Acephate, AgStar Acephate, Asie Acephate, Ceypetco Acephate, Apollo Acephate, CG Acephate
03.	Acetamiprid	20% SP	Mospilan Acetamiprid, Azeta Acetamiprid, Miyako Acetamiprid, Rock Acetamiprid, Baurs Acetamiprid
04.	Azadirachtin A	7.5 g/l EC	Lakgrow Neem
05.	Azadirachtin	50 g/l EC	NeemAzal F
06.	Azadirachtin	10 g/l EC	NeemAzal T/S
07.	Bistrifluron	100 g/l EC	Hanaro
08.	Brodifacoum	0.005% RB	Klerat Wax Blocks, Klerat Pellets
09.	Buprofezin	10% WP	Applaud 10 WP
10.	Buprofezin	250 g/l SC	Jawwa Buprofezin 25 SC
11.	Carbosulfan	200 g/l SC	Marshal 20 SC
12.	Chlorantraniliprole	200 g/l SC	Coragen
13.	Chlorantraniliprole + Thiometoxam	20+20 % WG	Virtako 40 WG
14.	Chlorfluazuron	50 g/IEC	Atabron 5 EC
15.	Chromafenozide	50 g/l SC	Podex Chromofenozide
16.	Deltamethrin	25 g/l EC	Decis Deltamethrin, Delta Deltamethrin, Delta-M Deltamethrin, Browns Deltamethrin
17.	Emamectin benzoate	5% SG	Proclaim 05 SG
18.	Ethiprole	100 g/l SC	Curbix Ethiprole
19.	Etofenprox	100 g/l EC	Trebon 10 EC
20.	Fenobucarb	500 g/l EC	Dozerr Fenobucarb, Bassa Fenobucarb, Hayleys BPMC, CG BPMC, Beepa Fenobucarb, Mackcarb BPMC, Dozerr Fenobucarb, BPMC 50 EC, Oasis BPMC 50%, BPMC Fenobucarb, Ceypetco BPMC

No	Common Name	Strength	Product Name
21.	Fenpyroximate	50 g/l EC	Mitigate
22.	Fipronil	50 g/l SC	Shutter Fipronil, Regent 50 SC, Zees Fipronil, Baurs Fipronil, Ranger Fipronil, Difender Fipronil, Grand Fipronil, CG Fipronil, Viper Fipronil, Arrears Fipronil, Fiprogen Fipronil, Wapper fipronil, Rio fipronil, Tamiron Fipronil, Ricon Fipronil, Hextar Fipronil, Agstar Fipronil
23.	Fipronil	0.3% GR	Baurs Fipronil, Prince Fipronil, ATL Fipronil, Fipronil Keta, Diligent 0.3 GR, Terminator Fipronil GR, Agstar Fipronil keta, Drill Fipronil, Plantchem Fipronil
24.	Flubendiamide	24% WG	Belt 240 WG
25.	Flubendiamide	20% WG	Takumi Flubendiamide
26.	Hexythiazox	50 g/l EC	Nissoran
27.	Imidacloprid	70% WG	Rocco Imidacloprid, Admire Imidacloprid, Provado Imidacloprid
28.	Imidacloprid	70% WS	Gaucho Imidacloprid
29.	Imidacloprid	200 g/l SL	Admire Imidacloprid, Sun Agro Imidacloprid, Imida Imidacloprid, Armour Imidacloprid, Oasis Imidacloprid, Kobra Imidacloprid, Merit Imidacloprid, Dynamic Imidacloprid, Tatamida Imidacloprid, Baurs Imidacloprid, CG Imidacloprid, Kohinor Imidacloprid, Apeel Imidacloprid, Dan Imidacloprid, Agstar Imidacloprid
30.	Indoxacarb	150 g/l EC	Avaunt
31.	Lambda-cyhalothrin	50 g/l SC	Metador 5 CS
32.	Lambda-cyhalothrin	25% CS	Demand Lambda-cyhalothrin
33.	Lufenuron	50 g/l EC	Zagro Lufenuron, Nuro Lufenuron
34.	Metaflumizone	240 g/l EC	Alverde
35.	Metaldehyd	3% RB	
36.	Metaldehyd	4% RB	
37.	Metaldehyd	6,5% RB	
38.	Methoxyfenozide	240 g/l SC	Runner SC 240
39.	Monocrotophos	60% SL	Monocrotophos 60 SL, CIC Monocrotophos
40.	Novaluron	100 g/l EC	Rimon 10 EC
41.	Phenthroate*	500 g/l EC	SunAgro Phenthroate, SeeSan Phenthroate, Leader Phenthroate, Hayleys Phenthroate, Elsan Phenthroate, Visan Phenthroate, Phenthroate 50 EC, ICS Phenthroate
42.	Pirimiphos methyl	500 g/l EC	Actellic 50 EC

No	Common Name	Strength	Product Name
43.	Profenofos	500 g/l EC	O- Cron Profenophos, Crown Profenofos, Jivro Profenofos, Calcron Profenofos, Hayleys Profenofos, CIC Profenophos, Lankem Profenofos, Kudus Profenophos, Prodan Profenophos, Oasis Profenophos, Baurcron Profenofos, Ceypetco Profenophos, Peron Profenofos, Gemini Profenofos, Harcros Profenofos, CG Profenophos, Grand Profenophos, Sun Agro Profenofos, Gem Profenofos
44.	Pymetrozine	50% WG	Chess Pymetrozine 50% WG
45.	Quinalphos*	250 g/l EC	Queen Quinalphos, Sucker Quinalphos, Quick Quinalphos, Quintox quinalphos, Baurs Quinalphos, Kuinal Quinalphos
46.	Sulphur	80% WP	Kumulus Sulphur, Baurs Sulphur
47.	Sulphur	80 WDG	Vitasul Sulphur, CG Sulphur, Sulmite Sulphur, Macksul Sulphur, Mitex Sulphur, Agstra Sulphur, Sulfex Sulphur, Sulfit Sulphur, Cosavet sulphur
48.	Spinosad	25 g/l SC	Success
49.	Spinetoram	25% WG	Radiant
50.	Sullfoxflor	50% WG	Transform 50% WG
51.	Thiacloprid	240 g/l SC	Calypso Thiacloprid, Alanto 240 SC
52.	Thiamethoxam	70% WS	Cruiser 70 WS
53.	Thiamethoxam	25% WG	Actara Thiamethoxam, Opex Thiamethoxam
54.	Thiocyclam (Hydrogen Oxalate)	50% SP	Evisect S
55.	Thiocyclam (Hydrogen Oxalate)	4% GR	Thiocyclam Hydrogen Oxalate 4% Evisect G
56.	Tebufenozide	200 g/l SC	Mimic 20 F

Mode of Action (MoA) Classification:

No	Mode of action	Target site and code	Group name
01.	A - Nucleic Acid Synthesis	A1: RNA polymerase 1	PA (PhenylAmides) fungicides
02.	B - Mitosis and cell division	B1: b tubuline assembly in mitosis B4: Cell division	MBC – (Methyl Benzimidazole Carbamates) Fungicides Phenylureas
03.	C - Respiration	C2: Complex II: succinate-dehydrogenase C3: Complex III: Cytochrome bc1 (ubiquinoloxidase) at Qo site (cyt b gene) C5: Uncouplers of oxidative phosphorylation	SDHI (Succinate dehydrogenase inhibitors) fungicides / Carboxamides QoI- fungicides (Quinone outside Inhibitors) Aniline fungicides
04.	D - Amino acids and protein synthesis	D3: protein synthesis	Hexopyranosyl antibiotics
05.	E - Signal transduction	E3: MAP/Histidine-Kinase in osmotic signal transduction (os - 1 , Daf1)	dicarboximides
06.	F - Lipids synthesis and membrane integrity	F2: Phospholipid biosynthesis, methyltransferase F4: Cell membrane permeability, fatty acids	Phosphorothiolates Dithiolanes Carbamates
07.	G - Sterol biosynthesis in membranes	G1: C14- demethylase in sterol biosynthesis (erg11/cyp51)	DMI – fungicides (De Methylation Inhibitors) (SB1:Class 1)
08.	H - Glucan synthesis	H5: Cellulose synthesis	CAA fungicides (Carboxylic Acid Amides)
09.	I - Melanin synthesis in cell wall	I1: Reductase in melanin biosynthesis	MBI-R (Melanin Biosynthesis Inhibitors Reductase)
10.	M - Multi- site contact activity	M3: Multi- site contact activity M3: Multi- site contact activity M3: Multi- site contact activity M3: Multi- site contact activity	Inorganic Dithiocarbamates and relatives Phthalimides Chloronitriles (phthalonitriles)
11.	U - Unknown mode of action	Unknown	Cyanoacetamideoxime

Registered Fungicide List with Trade Names 2019

No	Common Name	Strength	Product Name/Trade Name
01.	Azoxystrobin	250 g/l SC	Amistar 250 SC
02.	Captan	50% WP	Pentagan captan, CG Captan, Captaf Captan, Baur's Captan, Ceypetco Captan, ICS Captan
03.	Captan	80% WDG	Baur's captan
04.	Carbendazim	50% WP	Billet Carbendazim, Oasis Carbendazim, Hayleys Carbendazim, Benzor Carbendazim, CG Carbendazim.
05.	Carbendazim	500 g/l SC	Carbin Carbendazim
06.	Chlorothalonil	75% WP	Ole Chlorothalonil, Max Chlorothalonil, Bright Chlorothalonil, Choro Chlorothalonil, Thaloni Chlorothalonil
07.	Chlorothalonil	500 g/l SC	Ronil Chlorothalonil
08.	Chlorothalonil	40% SC	Solunil Chlorothalonil
09.	Copper (as copper oxychloride)	50% WP	CIC copper
10.	Copper (as copper hydroxide)	37.5% WG	Champ Copper Hydroxide
11.	Dimethomorph+ Mancozeb	9%+ 60 % WP	Acrobat MZ
12.	Dimethomorph+ Mancozeb	90 +600 g/kg	Baur's Dimethomorph
13.	Epoxiconazole	125 g/l SC	Opus
14.	Fluazinam	500 g/l SC	Tizca Fluazinam, Nando
15.	Flutolanil	50% WP	Moncut
16.	Flutriafol	250 g/l SC	Pointer Flutriafol, Impact Flutriafol
17.	Hexaconazole	5% SC	Emzole Hexaconazole, Hiper Hexaconazole
18.	Hexaconazole	50 g/l EC	Hexa Hexaconazole, Lazer Hexaconazole, Baur's Hexaconazole, Eraser Hexaconazole, Agstar Hexaconazole, Hero Hexaconazole, Eraser Hexaconazole, CIC Hexaconazole, Emzole Hexaconazole, Hayleys Hexaconazole, Hayleys Hexaconazole
19.	Isoprothiolane	400 g/l EC	Fuji-One 40 EC
20.	Mancozeb	80% WP	Mancozeb, Hayleys Mancozeb, Right Mancozeb, AgStar Mancozeb, Mancozeb 80% WP, Jumbo Mancozeb, Lankem Mancozeb, Farmers Mancozeb, Dynamic Mancozeb, Ceypetco Mancozeb, Samit Mancozeb, CIC Mancozeb, Dizeb Mancozeb, Dithane Mancozeb, Mackzeb Mancozeb, SunAgro Mancozeb, Unipower Mancozeb, Grand Mancozeb.

Pesticide Recommendations

Fungicides

No	Common Name	Strength	Product Name/Trade Name
21.	Mancozeb	75% WG	Zeero Mancozeb
22.	Mancozeb + Metalaxyl	64+8 % WP	Ridol Metalaxyl+, CIC Mancozeb +, Mancozeb+Metalaxy Laxy Mancozeb+, Metalaxy Ridoxyl Metalaxy +, Rid-All Mancozeb +
23.	Maneb	80% WP	Mannar Maneb, Baurs Maneb
24.	Metalaxyl + Mancozeb	4+64 % WG	Redomil Gold Metalaxy +
25.	Metiram + Pyraclostrobin	55+5 % WG	Baurs Pyraclostrobin +, Cabrio Top Pyraclostrobin +
26.	Pencycuron	25% WP	Monceren WP 25%
27.	Potassium bicarbonate	82% SP	Kaligreen
28.	Propamocarb	607 g/l SL	Previcur 607 SL
29.	Propiconazole	250 g/l EC	Sira Propiconazole, Lankem Propiconazole, Oasis Propiconazole, Bumper Propiconazole
30.	Propineb	70% WP	Protocol Propineb, Trazol Propineb, Trazol Propineb, Trazo Propineb, Antracol Propineb
31.	Sulphur	80% WG	Vitasul Sulphur, Kumulus Sulphur, Sulmite Sulphur, Baurs Sulphur, CG Sulphur, Zagro Sulphur, Mitex Sulphur, Cosavet Sulphur
32.	Tebuconazole	250 g/l EW	Folicur Tebuconazole, Lankem Tebuconazole, Orius Tebuconazole
33.	Thiophanate-methyl	70% WP	Morison Thiophanate Methyl.
34.	Thiophanate-methyl + Thiram	50+30 % WP	Homai
35.	Thiram	80% WP	Oasis Thiram, Plantchem Thiram, CG Thiram, Scope Thiram.
36.	Tricyclazole	75% WP	Guru
37.	Tryfloxystrobin + Tebuconazole	250+500 g/kg WG	Nativo 75 WG

Mode of action (MOA) Classification: Ref HRAC 2019

No	MOA Class	Strength	Product Name
01.	Inhibition of acetyl CoA carboxylase (ACCase)	A	Profoxydim Cyhalofop-butyl Metamifos Fenoxyprop-p-ethyl
02.	inhibited acetolactate synthase (ALS)	B	Halosulfuron-methyl Nicosulfuron Pyrazosulfuron-ethyl Bispyribac-sodium Penoxulam Flucetosulfuron Propyrisulfuron Triafamone Ethoxysulfuron Pyribenzoxim Cyclosulfamuron Bensulfuron-methyl Metsulfuron-methyl Azimsulfuron Orthosulfamuron Flucetosulfuron Bentazone Imazethapyr Ametyn
03.	Inhibition of photosynthesis at photosystem II	C1	Metribuzin
04.	Inhibition of photosynthesis at photo system II	C2	Propanil 400
05.	Inhibition of protoporphyrinogen oxidase (PPO)	E	Oxyfluorfen Tiafenacil Carfentrazone-ethyl
06.	Bleaching: Inhibition of 4-hydroxyphenyl-pyruvate-dioxygenase (4-HPPD)	F4	Clomazone
07.	Bleaching: Inhibition of 4-hydroxyphenyl-pyruvate-dioxygenase (4-HPPD)	F2	Topramezone
08.	Inhibition of glutamine synthetase	H	Glyfosinate ammonium
09.	Microtubule assembly inhibition	K1	Pendimethalin
10.	cell division inhibitor	K3	Pretilachlor
11.	Lipid synthesis inhibition	N	+ Thiobencarb

No	MOA Class	Strength	Product Name
12.	Action like indole acetic acid	O	Quinclorac MCPCA, Florpyrauxifen benzyl
13.	Desiccates the vegetation by Distruption of waxy cuticle	Z	Pelargonic acid
14.	Inhibits the plant enzyme 4- hydroxyphenylpyruvate dioxygenase (HPPD)		
15.	Inhibition of EPSP synthase	G	Glyphosate

Registered Herbicides List with Trade Names - 2019

No	Common Name	Strength	Product Name
01.	Ametryn + Trifloxsulfuron- sodium	73.1 + 1.8%	Krismat 75 WG
02.	Azimsulfuron	50% WG	Gulliver
03.	Bensulfuron-methyl + Metsulfuron-methyl	8.25 + 1.75% WP	Sindax 10 WP
04.	Bentazone	48% SL	Ahura bentazone
05.	Bispyribac sodium 40 g/l + Metamipof 100 g/l	40 + 100 g/l SE	Kiseki
06.	Bispyribac-sodium	20% WP	Paddy Gold Bispyribac Sodium, Kensolo Bispyribac Sodium
07.	Bispyribac-sodium	100 g/l SC	Mikasa Bispyribac Sodium, Omega Bispyribac Sodium, Weego Bispyribac Sodium, Nominee Bispyribac-Sodium
08.	Carfentrazone-ethyl	240 g/l EC	Affinity
09.	Carfentrazone-ethyl	40% WDG	Kimura
10.	Cyhalofop-butyl	100 g/l EC	Clincher, M
	Clomazone +Propanil	200 g/l + 400 g/l EC	Compro 60 EC
11.	Cyhalofop-butyl	20% EC	Clincher Plus
	Cyhalofop-butyl + Pyribenzoxim	8.5 % EC	Wondergold
12.	Diuron	80% WP	Oasis diuron, Ducron Diuron, Hayleys Diuron, Ceypetco Diuron, Unipower Diuron, Lankem Diuron, Agstar Diuron, CIC Diuron, CG Diuron, Browns Diuron, Viron Diuron, Plantchem Diuron, Baurs Diuron, ICS Diuron, Japlan Diuron
13.	Diuron	500 g/l SC	Liquido Diuron

No	Common Name	Strength	Product Name
14.	Fenoxaprop- <i>p</i> -ethyl	69 g/l EC	Ricestar fenoxaprop ethyl
15.	Fenoxaprop- <i>p</i> -ethyl	75 g/l EW	Whip Fenoxaprop- <i>p</i> - ethyl, Tara Fenoxaprop- <i>p</i> -ethyl, Whip Super Fenoxaprop- <i>p</i> -ethyl, Rip Fenoxaprop- <i>p</i> -Ethyl
16.	Fenoxaprop- <i>p</i> -ethyl + Ethoxysulfuron	69 + 20 g/l OD	Tiller Gold fenoxaprop- <i>p</i> -ethyl +, Tiller Gold fenoxaprop- <i>p</i> -ethyl +, Ricestarxtra Fenoxaprop- <i>p</i> -ethyl +
17.	Florpyrauxifen benzyl	25 g/l EC	Loyant
18.	Flucetosulfuron	10% WG	Salfi Flucetosulfuron, Fluto Flucetosulfuron
19.	Glufosinate ammonium	150 g/l SL	Basta
20.	Glufosinate ammonium	280 g/l SC	
21.	Glyphosate	360 g/l SL	Ceypetco Glyphosate
22.	Halosulfuron-methyl	75% WG	Permit
23.	MCPA	600 g/l SL	ICS MCPA 60, Mackwoods MCPA, Morale MCPA 60, Magic MCPA, Baurmat MCPA 60, Morice MCPA, Lankem M-50, CIC MCPA 60, Harcros M.C.P.A. 60, Plan'z tchem MCPA, Hayleys MCPA 60
24.	Imazethapyr	10% SC-	Persuit
25.	Metamifop	10% EC	Matari
26.	Metribuzin	70% WG	Oasis Metribuzin
27.	Metribuzin	70% WP	Sencor Metribuzin
28.	Nicosulfuron	40 g/l OD	Topaz
29.	Orthosulfamuron	50% WG	Strada Orthosulfamuron
30.	Oxyfluorfen	240 g/l EC	OxyGuard Oxyfluorfen, Goal Oxyfluorfen, Gallop Oxyfluorfen, Oxo Oxyfluorfen, Osilo Oxyfluorfen, Galigan Oxyfluorfen, Kitto Oxyfuluorfen, Sonic Oxyfluorfen, Goal Tender
31.	Pendimethalin	300 g/l EC	Rower Pendimethalin, Stomp Pendimethalin
32.	Pretilachlor	300 g/l EC	Clear Pretilachlor, Baurs Pretilachlor, Sofit Pretilachlor, Set Pretilachlor, Solid Pretilachlor, Harness Pretilachlor

*DAS = Days After Sowing * DAP = Days After Planting

No	Common Name	Strength	Product Name
33.	Pretilachlor +Proponil	170 +300 EC	
34.	Pretilachlor + Pyribenzoxim	300 + 20 g/l EC	Solito
35.	Penoxulam	240 g/l SC	
36.	Profoxydim	75 g/l EC	
37.	Propanil + MCPA	60% + 7.5 % DF	Grant
38.	Propanil + Thiobencarb	200 g/l EC + 400 g/l	Saturn plus
39.	Propyrisulfuron	100 g/l SC	Sumo
40.	Pyrazosulfuron-ethyl	10% WP	Pyrazosulfuron Ethyl, Saathi Pyrosulfuronethyl, Risen Pyrazosulfuron- Ethyl, Sirius Pyrazosulfuron ethyl, Baurs Pyrazosulfuron Ethyl
41.	Pyribenzoxim	50 g/l EC	Pyanchor
42.	Quinclorac	250 g/l SC	Focus Quinclorac, Facet Quinclorac, Baurs Quinclorac
43.	Thiobencarb + Bispyribac-sodium	900 + 15 g/l OD	Solo
44.	Tiafenacil	5% ME	Terado
45.	Topramezone	336 g/l SC	Clio
46.	Triafamone	200 g/l SC	Council Prime