

## **Fertilizer and Pest Management Plan**

Fertilizer and Pesticide Management Plan - an environmental perspective

### Introduction

Fertilizer and Pesticide management is paramount in safeguarding the environment from the detrimental impacts of these chemical substances. Through effective regulation and implementation of practices such as integrated nutrient management (INM) and integrated pest management (IPM), we can mitigate the risks posed by overuse of fertilizers and pesticides to biodiversity, water quality, soil health, and human well-being. By minimizing non-target effects on beneficial organisms, reducing fertilizer/pesticide runoff into water bodies, preserving soil fertility, and addressing the development of pesticide resistance, proper management ensures the sustainability of agricultural systems while maintaining the balance of ecosystems. Moreover, fertilizer and pesticide management promote the use of safer alternatives and encourages practices that prioritize long-term environmental health, thus playing a critical role in protecting the delicate balance of our natural world.

### Objective:

The overall objectives of the fertilizer and pesticide management plan aim to promote safe, effective, and sustainable fertilizer/pesticide use while minimizing adverse impacts on human health and the environment.

The UPDASP project triggers the following safeguard policy of the World Bank with respect to use of pesticides and Pest Management:

### Pest Management (OP 4.09)<sup>1</sup>

The operational policy (4.09) statement was revised in August 2004 and replaces the version dated July 1996. The bank assesses the capacity of the country's regulatory framework and institutions to promote and support safe, effective and environmentally sound pest management. It is necessary for borrowers to manage pests that affect agriculture, through the safe use of pesticides and support integrated pest management (IPM) mentioned in Annexure 3.

### Scope and applicability

The fertilizer and pesticide management plan typically encompasses various aspects related to the handling, usage, and disposal of fertilizers/pesticides. Within the context of agriculture, the plan focuses on stakeholders who will be involved in implementing and adhering to the environmental guidelines (refer Annexure 4) outlined in the plan. This may include farmers, fertilizer/pesticide vendors & applicators, farm labourers, government agencies, and the public.

Fertilizers are the chemical substance that is used to increase the production and yielding capacity of crops. There are two types of fertilizers used by farmers that are available in the market. They are inorganic and organic fertilizers. Inorganic fertilizers are mostly Nitrogen (N), Potassium (K<sub>2</sub>O), Phosphorous (P<sub>2</sub>O<sub>5</sub>), Sulphur (S), Magnesium (Mg) and Calcium (C) based chemical compositions and micronutrients (Boron, Chlorine, Copper, Iron, Manganese, Zinc) that are crucial elements that helps in growth, cell proliferation, crop quality and plant's disease resistance.

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<sup>1</sup> OP 4.09 – Pest Management, Operational Manual, The World Bank. ([www.thedocs.worldbank.org](http://www.thedocs.worldbank.org))

In India, fertilizer production is about 20.75 million MT (N+P<sub>2</sub>O<sub>5</sub>) during 2022-23 recorded an increase of 11.6% over 2021-22. Production of nitrogen (N) increased by 13.5% to 15.74 million MT and phosphate (P<sub>2</sub>O<sub>5</sub>) increased by 6.3% to 5.01 million MT in 2022-23.

The total fertilizer nutrient consumption (N+P<sub>2</sub>O<sub>5</sub> +K<sub>2</sub> O) registered a marginal growth of 0.2% at 29.84 million MT (metric tonnes) in 2022-23. The consumption of Nitrogen and Phosphorous accounts to 20.21 million MT and 7.92 million MT with a registered 4% and 1.2 % increase during 2022-23 over 2021-22, respectively<sup>2</sup>. The consumption of potassium declined by 32.2% to 1.72 million in 2022-23. All-India NPK use ratio widened from 7.7: 3.1:1 during 2021-22 to 11.8:4.6:1 during 2022-23. Around 92% fertilizer consumption by 13 states in that Uttar Pradesh had the largest share (17.6%) followed by Maharashtra (9.5%) and Madhya Pradesh (9.4%).

Per hectare use of total nutrients (N+P<sub>2</sub>O<sub>5</sub>+K<sub>2</sub>O) improved marginally from 141.0 kg in 2021-22 to 141.2 kg in 2022-23.

As the sown area under all kharif crops has marginally up by 0.3% to 105.4 million hectares during 2023 from 105 million hectares during the corresponding period in the previous year. As the consumption of fertilizers would increase with sown area in coming years, it is vital to integrate organic fertilizers as they are safer alternatives to chemical fertilizers and adopt integrated nutrient management (INM) practices in the agriculture.

Organic fertilizers are naturally derived substances and microbial cultures that helps in plant growth and yielding capacity. e.g., manure, biofertilizers, compost etc.

Integrated Nutrient Management is knowing the nutrient status of soil through soil testing and reduce the use of chemical fertilizers. It reduces cost of cultivation and prevents leach out/seepage of residues from overuse of chemical fertilizers. Integrated Nutrient management practices are to be followed for supplying nutrients are listed below,

**Mineral Fertilizer:** Super granules, coated urea, direct use of locally available rock PO<sub>4</sub> in acid soils, Single Super Phosphate (SSP), MOP and micronutrient fertilizers.

**Organic Sources:** By products of farming and allied industries. FYM, droppings, crop waste, residues, sewage, sludge, industrial waste.

**Biological Sources:** Microbial inoculants substitute 15 - 40 Kg N/ha

Pesticides are chemical substances that are used to control pests. In the agriculture context, there are different types of pesticides covered under the plan which could include insecticides, herbicides, fungicides, rodenticides, and other chemical agents designed to control pests or diseases.

Insecticides, fungicides and herbicides are commonly used in Indian agriculture. However, Insecticides occupies the largest share in total pesticides use in India. The total pesticide consumption has declined 17.09% to 52466 metric tonnes (technical grade) during 2022-23 from 63284 metric tonnes during the previous year, according to Directorate of Plant Quarantine and Storage, Government of India. Among the states, Uttar Pradesh (22.54%,11824 MT) is the largest

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<sup>2</sup> Annual Review of Fertilizer Production and Consumption 2022-23, Fertilizer Association of India ([www.faidelhi.org/general/AR-EX-Sum.pdf](http://www.faidelhi.org/general/AR-EX-Sum.pdf))

consumer of technical grade pesticides followed by Maharashtra (12.9%, 6814 MT) and Punjab (9.78%, 5130 MT)<sup>3</sup>.

Year	Total Pesticide Consumption (metric tonnes)	YoY Consumption Difference (%)
2019-20	61702	3.41%
2020-21	62193	0.80%
2021-22	63284	1.75%
2022-23	52466	-17.09%

Source: [www.ppqqs.gov.in](http://www.ppqqs.gov.in)

Due to hazardous nature of pesticides, the focus from chemical pesticides has to shift to reliable, sustainable and environment friendly options, such as biopesticides. In India, there is a significant increase in the consumption of biopesticides to 7 tonnes during 2022-23 from 3 tonnes in 2016-17, the state of Uttar Pradesh consumes 53 tonnes (0.7%) among the other states. Studies indicate that Biopesticides use in IPM can significantly reduce pesticides use in cotton and vegetable crops. (refer Annexure 5 for detailed crop-specific biological, cultural and physical pest control practices)

Geographical Context: The plan delineates a holistic approach to fertilizers and pesticides management to address the agricultural and environmental considerations of India, such as fertilizer/pesticide use regulations and common crop-specific guidelines (Annexure 4 & 5) may apply. Recognizing the diversity of crops cultivated across different regions of India, the plan provides crop-specific guidelines for pesticide usage, dosage, and application methods. It prioritizes strategies to promote sustainable agricultural practices that minimizes reliance on chemical fertilizers and pesticides.

#### Regulatory Compliance:

The objective of the Project is to increase access to value-added activities and job opportunities in the targeted households that would help the producer groups and entrepreneurs to increase their household incomes and attain quality life.

It is important that the Enterprises (Individual and Group), Value chains and Producer Collectives are in tune with the laws and regulations of the country and the state. Compliance rather than being restrictive provides an opportunity to align the investments with sound and sustainable management of resources. This section presents a brief listing of the various Acts, Rules and Regulations of the Government of India, the state Government as well as the safe guard policies of the World Bank.

On the basis of the alignment of the proposed UPDASP interventions with respect to these laws and regulations, a Regulatory Requirements List has been developed and enclosed as an Annexure 1 & 2.

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<sup>3</sup> Statistical Database | Directorate of Plant Protection, Quarantine & Storage | GOI ([ppqs.gov.in](http://ppqs.gov.in))

The plan ensures compliance with relevant laws, regulations, and guidelines governing pesticide use, storage, transportation, and disposal according to below act,

S.No	Act, Policy or Government Order	Key Provisions	Relevance to UPDASP
1	Insecticides Act, 1968  Amendment: Insecticides (Amendment) Act, 1977 (24 of 1977)	To regulate the import, manufacture, sale, transport, distribution, and use of insecticides with a view to prevent risk to human beings or animals, and for matters connected therewith.  A license is required for the sale, stock or exhibition of sale or distribution of any insecticide. The use of certain insecticides is prohibited or restricted under this Act.	Applicable.  All Producer Groups involve in activities like procurement, stocking and sale of insecticides as all the crop productivity enhancement is planned through nonchemical methods.

The plan ensures compliance with relevant laws, regulations, and guidelines governing fertilizer use, storage, transportation, and disposal according to below act,

S.No	Act, Policy or Government Order	Key Provisions	Relevance to UPDASP
1	The Fertilizer (Control) Order, 1985	Registration is required for selling fertilizer at any place as wholesale dealer or retail dealer.	Applicable where collective procurement and distribution happens through Producer Groups.

#### Regulatory requirements list

There are certain kinds of activities which, if taken up, would contravene the laws and regulations of the State Government, Government of India as well as Safeguards Policies of the World Bank. Such activities will not be supported by the UPDASP project. Given below is a list of attributes that would disqualify an activity from being supported under UPDASP. This list shall be treated as the screening tool for the activities planned to be taken by project beneficiaries.

Purchase, stock, sale, distribution or exhibition of the following pesticides will not be supported:

pesticides classified in Class Ia, Ib and II of World Health Organisation classification of Pesticides by Hazard and Guidelines to classification (refer Annexure 2)

pesticides banned by the Government of India (refer Annexure 1)

pesticides banned by the State Government.

Purchase, stock, sale, distribution or exhibition of pesticides and chemical fertilizers will not be supported without the requisite licenses.

As well as the following criteria apply to the selection and use of pesticides in the World Bank-financed projects:

They must have negligible adverse human health effects

They must be shown to be effective against the target species

They must have minimal effect on nontarget species and the natural environment. The methods, timing, and frequency of pesticide application are aimed to minimize damage to natural enemies. Pesticides used in public health programs must be demonstrated to be safe for inhabitants and domestic animals in the treated areas, as well as for personnel applying them.

Their use must take into account the need to prevent the development of resistance in pests

List of pesticides and regulations pertaining to banned, refused registration and restricted to use has been published by Directorate of Plant Protection, Quarantine and Storage under the Department of Agriculture and Farmers Welfare as on 01.06.2023. (Refer Annexure 1) for complete list of pesticides banned, refused registration and restricted to use.

The regulatory guidelines are given for potential activities by the Environment Specialist. Pest Management Plan (PMP) is given in Annexure 3 since it is mandate according to OP 4.09. Different methods in PMP and different crops which have potential to be supported by UPDASP were covered.

Training and Education:

The PMP will be implemented in all agriculture and irrigation system development activities. The implementation will be supported by capacity building of project teams including Community Professionals and monitoring.

Capacity Building:

As part of PMP, the Agriculture Enterprises beneficiaries of the project will be trained on PMP in the first year and refresher trainings will be conducted once every year. The training will be organized by Community Farm Schools and facilitated by the Enterprises and sourced by the State Environment Resource Agency (SERA).

Training the Enterprises beneficiaries on

Importance and need for pest management

Pest Management Plan for the project

Technical aspects in Pest management:

Identification of pests and beneficial insects in the field

Determining the economic threshold levels (the density at which they begin to cause economically significant losses) of different pests in different crops

Designing and supporting the implementation of a pest management strategy giving preference to alternative pest management strategies, with the use of synthetic chemical pesticides as the last

option. The indicative list of pest management practices for different crops is provided in the appendix 1.

Precautions to be taken during the purchase, store and use of pesticides and disposal of the wastes and containers.

Information Education and Communication (IEC) materials will be developed targeting the Enterprise and Producer Collectives which will include – posters, films, handbooks etc.

#### Monitoring:

During every crop cycle the monitoring will be done by the Community Professionals. At the end of every crop they will give a report which will capture the progress on PMP (number of PMPs adopted). Review of PMP will be done as part of regular review meetings on agriculture. The SERA will provide a yearly update on the PMP status based on the field visits and progress reports on PMP. The external audit will also capture the impact of PMP.

**Record Keeping and Documentation:** It is crucial to maintain accurate records of fertilizer stock register, pesticide usage, application rates, dates, locations, and other relevant information to track compliance and facilitate monitoring and reporting.

## Annexure 1

## PESTICIDES / FORMULATIONS BANNED IN INDIA

Pesticides Banned for manufacture, import and use .	
1.	Alachlor (Vide S.O. 3951 (E), dated 08.08.2018)
2.	Aldicarb (vide S.O. 682 (E) dated 17th July 2001)
3.	Aldrin
4.	Benzene Hexachloride
5.	Benomyl (vide S.O 3951(E) dated 8th August, 2018)
6.	Calcium Cyanide
7.	Carbaryl (vide S.O 3951(E) dated 8th August, 2018)
8.	Chlorbenzilate (vide S.O. 682 (E) dated 17th July 2001)
9.	Chlordane
10.	Chlorofenvinphos
11.	Copper Acetoarsenite
12.	Diazinon (vide S.O 3951(E) dated 8th August, 2018)
13.	Dibromochloropropane (DBCP) (vide S.O. 569 (E) dated 25th July 1989)
14.	Dichlorovos (Vide S.O. 3951 (E), dated 08.08.2018)
15.	Dieldrin (vide S.O. 682 (E) dated 17th July 2001)
16.	Endosulfron (vide ad-Interim order of the Supreme Court of India in the Writ Petition (Civil) No. 213 of 2011 dated 13th May, 2011 and finally disposed of dated 10th January, 2017)
17.	Endrin
18.	Ethyl Mercury Chloride
19.	Ethyl Parathion
A. 20.	Ethylene Dibromide (EDB) (vide S.O. 682 (E) dated 17th July 2001)
21.	Fenarimol (vide S.O 3951(E) dated 8th August, 2018)
22.	Fenthion (vide S.O 3951(E) dated 8th August, 2018)
23.	Heptachlor
24.	Lindane (Gamma-HCH)
25.	Linuron (vide S.O 3951(E) dated 8th August, 2018)

26.	Maleic Hydrazide (vide S.O. 682 (E) dated 17th July 2001)
27.	Menazon
28.	Methoxy Ethyl Mercury Chloride (vide S.O 3951(E) dated 8th August, 2018)
29.	Methyl Parathion (vide S.O 3951(E) dated 8th August, 2018)
30.	Metoxuron
31.	Nitrofen

32.	Paraquat Dimethyl Sulphate	
33.	Pentachloro Nitrobenzene (PCNB) (vide S.O. 569 (E) dated 25th July 1989)	
34.	Pentachlorophenol	
35.	Phenyl Mercury Acetate	
36.	Phorate (Vide S.O. 3951 (E), dated 08.08.2018)	
37.	Phosphamidon (Vide S.O. 3951 (E), dated 08.08.2018)	
38.	Sodium Cyanide ( banned for Insecticidal purpose only vide S.O 3951(E) dated 8th August, 2018)*	
39.	Sodium Methane Arsonate	
40.	Tetradifon	
41.	Thiometon (vide S.O 3951(E) dated 8th August, 2018)	
42.	Toxaphene(Camphechlor) (vide S.O. 569 (E) dated 25th July 1989)	
43.	Triazophos (Vide S.O. 3951 (E), dated 08.08.2018)	
44.	Tridemorph (vide S.O 3951(E) dated 8th August, 2018)	
45.	Trichloro acetic acid (TCA) (vide S.O. 682 (E) dated 17th July 2001)	
46.	Trichlorfon (Vide S.O. 3951 (E), dated 08.08.2018)	
B.	Pesticide formulations banned for import, manufacture and use	
	1.	Carbofuron 50% SP (vide S.O. 678 (E) dated 17th July 2001)
	2.	Methomyl 12.5% L
	3.	Methomyl 24% formulation
	4.	Phosphamidon 85% SL
	Pesticide / Pesticide formulations banned for use but continued to manufacture for export	
	1.	Captafol 80% Powder (vide S.O. 679 (E) dated 17th July 2001)

C.	2.	Dichlorvos (vide S.O. 1196 (E) dated 20th March 2020)
	3.	Nicotin Sulfate (vide S.O. 325 (E) dated 11th May 1992)
	4.	Phorate (vide S.O. 1196 (E) dated 20th March 2020)
	5.	Triazophos (vide S.O. 1196 (E) dated 20th March 2020)
D.	Pesticides Withdrawn (Withdrawal may become inoperative as soon as required complete data as per the guidelines is generated and submitted by the Pesticides Industry to the Government and accepted by the Registration Committee. (S.O 915(E) dated 15th Jun,2006)	
	1.	Dalapon
	2.	Ferbam
	3.	Formothion
	4.	Nickel Chloride
	5.	Paradichlorobenzene (PDCB)
	6.	Simazine
	7.	Sirmate (S.O. 2485 (E) dated 24th September 2014)
	8.	Warfarin (vide S.O. 915 (E) dated 15th June 2006)

\* Regulation to be continued in the extant manner for non-insecticidal uses.

PESTICIDES REFUSED REGISTRATION

S. No.	Name of Pesticides
1.	2,4, 5-T
2.	Ammonium Sulphamate
3.	Azinphos Ethyl
4.	Azinphos Methyl
5.	Binapacryl
6.	Calcium Arsenate
7.	Carbophenothion
8.	Chinomethionate (Morestan)
9.	Dicrotophos
10.	EPN
11.	Fentin Acetate
12.	Fentin Hydroxide
13.	Lead Arsenate
14.	Leptophos (Phosvel)
15.	Mephosfolan
16.	Mevinphos (Phosdrin)
17.	Thiodemeton / Disulfoton
18.	Vamidotion

PESTICIDES RESTRICTED FOR USE IN THE COUNTRY

S. No.	Name of Pesticides	Details of Restrictions
1.	Aluminium Phosphide	<p>The Pest Control Operations with Aluminium Phosphide may be undertaken only by Govt./Govt. undertakings / Govt. Organizations / pest control operators under the strict supervision of Govt. Experts or experts whose expertise is approved by the Plant Protection Advisor to Govt. of India except 1Aluminium Phosphide 15 % 12 g tablet and 2Aluminum Phosphide 6 % tablet. [RC decision circular F No. 14-11(2)-CIR-II (Vol. II) dated 21-09-1984 and G.S.R. 371(E) dated 20th may 1999]. 1Decision of 282nd RC held on 02-11-2007 and, 2Decision of 326th RC held on 15-02-2012.</p> <p>The production, marketing and use of Aluminium Phosphide tube packs with a capacity of 10 and 20 tablets of 3 g each of Aluminium Phosphide are banned completely. (S.O.677 (E) dated 17thJuly, 2001)</p>
2.	Captafol	<p>The use of Captafol as foliar spray is banned. Captafol shall be used only as seed dresser. (S.O.569 (E) dated 25thJuly, 1989)</p> <p>The manufacture of Captafol 80 % powder for dry seed treatment (DS) is banned for use in the country except manufacture for export. (S.O.679 (E) dated 17thJuly, 2001)</p>
3.	Cypermethrin	<p>Cypermethrin 3 % Smoke Generator is to be used only through Pest Control Operators and not allowed to be used by the General Public. [Order of Hon,ble High Court of Delhi in WP(C) 10052 of 2009 dated 1407-2009 and LPA-429/2009 dated 08-09-2009]</p>
4.	Dazomet	<p>The use of Dazomet is not permitted on Tea. (S.O.3006 (E) dated 31st Dec, 2008)</p>

5.	Dichloro Diphenyl Trichloroethane (DDT)	<p>The use of DDT for the domestic Public Health Programme is restricted up to 10,000 Metric Tonnes per annum, except in case of any major outbreak of epidemic. M/s Hindustan Insecticides Ltd., the sole manufacturer of DDT in the country may manufacture DDT for export to other countries for use in vector control for public health purpose. The export of DDT to Parties and State non- Parties shall be strictly in accordance with the paragraph 2(b) article 3 of the Stockholm Convention on Persistent Organic Pollutants (POPs).</p> <p>(S.O.295 (E) dated 8th March, 2006)</p>
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		<p>Use of DDT in Agriculture is withdrawn. In very special circumstances warranting the use of DDT for plant protection work, the state or central Govt. may purchase it directly from M/s Hindustan Insecticides Ltd. to be used under expert Governmental supervision.</p> <p>(S.O.378 (E) dated 26thMay, 1989)</p>
6.	Fenitrothion	<p>The use of Fenitrothion is banned in Agriculture except for locust control in scheduled desert area and public health.</p> <p>(S.O.706 (E) dated 03rdMay, 2007)</p>
7.	Methyl Bromide	<p>Methyl Bromide may be used only by Govt./Govt. undertakings/Govt. Organizations / Pest control operators under the strict supervision of Govt. Experts or Experts whose expertise is approved by the Plant Protection Advisor.</p> <p>[G.S.R.371 (E) dated 20thMay, 1999 and earlier RC decision]</p>
8.	Monocrotophos	<p>Monocrotophos is banned for use on vegetables. (S.O.1482 (E) dated 10thOct, 2005)</p>
9.	Trifluralin	<p>The Registration, import, manufacture, formulation, transport, sell and its all uses except use in wheat shall be prohibited and completely banned from 8th August, 2018.</p> <p>(ii) A cautionary statement has to be incorporated in the label and leaflet that it is toxic to aquatic organism, hence should not be used near water bodies, aquaculture or pisciculture area.</p> <p>(vide S.O 3951(E) dated 8th August, 2018)</p>



## Annexure 2

The WHO classification of pesticides by hazard:

1. Extremely hazardous (Class Ia) technical grade active ingredients of pesticides (common name) – Not permissible in the project

Common name		
Aldicarb	Difenacoum	Mevinphos
Brodifacoum	Difethialone	Parathion
Bromadiolone	Diphacinone	Parathion-methyl
Bromethalin	Disulfoton	Phenylmercury acetate
Calcium cyanide	EPN	Phorate
Captafol	Ethoprophos	Phosphamidon
Chlorethoxyfos	Flocoumafen	Sodium fluoroacetate
Chlormephos	Hexachlorobenzene	Sulfotep
Chlorophacinone	Mercuric chloride	Tebupirimfos
		Terbufos

2. Highly hazardous (Class Ib) technical grade active ingredients of pesticides (common name) – Not permissible in the project

Common name		
Acrolein	Dinoterb	Methomyl
Allyl alcohol	DNOC	Monocrotophos
Azinphos-ethyl	Edifenphos	Nicotine
Azinphos-methyl	Ethiofencarb	Omethoate
Blastidicin-S	Famphur	Oxamyl
Butocarboxim	Fenamiphos	Oxydemeton-methyl
Butoxycarboxim	Flucythrinate	Paris green
Cadusafos	Fluoroacetamide	Pentachlorophenol
Calcium arsenate	Formetanate	Propetamphos
Carbofuran	Furathiocarb	Sodium arsenite
Chlorfenvinphos	Heptenophos	Sodium cyanide
3-Chloro-1, 2-propanediol	Isoxathion	Strychnine

Coumaphos	Lead arsenate	Tefluthrin
Coumatetralyl	Mecarbam	Thallium sulfate
Zeta-cypermethrin	Mercuric oxide	Thiofanox
Demeton-S-methyl	Methamidophos	Thiometon
Dichlorvos	Methidathion	Triazophos
Dicrotophos	Methiocarb	Vamidothion
	Zinc phosphide	Warfarin

3. Moderately hazardous (Class II) technical grade active ingredients of pesticides (common name) –  
Not permissible in the project

Common name		
Alanycarb	Dimethoate	Molinate
Anilofos	Dinobuton	Nabam
Azaconazole	Diquat	Naled
Azocyclotin	Endosulfan	Paraquat
Bendiocarb	Endothal-sodium	Pebulate
Benfuracarb	EPTC	Permethrin
Bensulide	Esfenvalerate	Phenthoate
Bifenthrin	Ethion	Phosalone
Bilanafos	Fenazaquin	Phosmet
Bioallethrin	Fenitrothion	Phoxim
Bromoxynil	Fenobucarb	Piperophos
Bromuconazole	Fenpropidin	Pirimicarb
Bronopol	Fenpropathrin	Prallethrin
Butamifos	Fenthion	Profenofos
Butylamine	Fentin acetate	Propiconazole
Carbaryl	Fentin hydroxide	Propoxur
Carbosulfan	Fenvalerate [ISO]	Prosulfocarb
Cartap	Fipronil	Prothiofos
Chloralose	Fluxofenim	Pyraclufos
Chlorfenapyr	Fuberidazole	Pyrazophos
Chlordane	Gamma-HCH, Lindane	Pyrethrins
Chlorphonium chloride	Guazatine	Pyroquilon
Chlorpyrifos	Haloxfop	Quinalphos
Clomazone	HCH	Quizalofop-p-tefuryl
Copper sulfate	Imazalil	Rotenone
Cuprous oxide	Imidacloprid	Spiroxamine
Cyanazine	Iminoctadine	TCA (acid)

Cyanophos	Ioxynil	Terbumeton
Cyfluthrin	Ioxynil octanoate	Tetraconazole
Beta-cyfluthrin	Isoprocarb	Thiacloprid
Cyhalothrin	Lambda-cyhalothrin	Thiobencarb
Cypermethrin	Mercurous chloride	Thiocyclam
Alpha-cypermethrin	Metaldehyde	Thiodicarb
Cyphenothrin [(1R)-isomers]	Metam-sodium	Tralomethrin
2,4-D	Methacrifos	Triazamate
DDT	Methasulfocarb	Trichlorfon
Deltamethrin	Methyl isothiocyanate	Tricyclazole
Diazinon	Metolcarb	Tridemorph
Difenzoquat	Metribuzin	Xylcarb

4. Slightly hazardous (Class III) technical grade active ingredients of pesticides (common name) – Permissible under IPM

Common name		
Acephate	Dinocap	Nitrapyrin
Acetochlor	Diphenamid	Nuarimol
Acifluorfen	Dithianon	Octhilinone
Alachlor	Dodine	N-octyl bicyclo heptene dicarboximide
Allethrin	Empenthrin	Oxadixyl
Ametryn	Esprocarb	Paclobutrazol
Amitraz	Etridiazole	Pendimethalin
Azamethiphos	Fenothiocarb	Pimaricin
Bensultap	Ferimzone	Pirimiphos-methyl
Bentazone	Fluazifop-p-butyl	Prochloraz
Butralin	Fluchloralin	Propachlor
Butoxydim	Flufenacet	Propanil
Chinomethionat	Fluoroglycofen	Propargite
Chlormequat (chloride)	Flurprimidol	Pyrazoxyfen

Chloroacetic acid	Flusilazole	Pyridaben
Copper hydroxide	Flutriafol	Pyridaphenthion
Copper oxychloride	Fomesafen	Pyridate
4-CPA	Furalaxyl	Pyrifenox
Cycloate	Glufosinate	Quinoclamine
Cyhexatin	Hexazinone	Quizalofop
Cymoxanil	Hydramethylnon	Resmethrin
Cyproconazole	Iprobenfos	Sethoxydim
Dazomet	Isoprothiolane	Simetryn
2,4-DB	Isoproturon	Sodium chlorate
Dicamba	Isouron	Sulfluramid
Dichlormid	Malathion	2,3,6-TBA
Dichlorobenzene	MCPA	Tebuconazole
Dichlorophen	MCPA-thioethyl	Tebufenpyrad
Dichlorprop	MCPB	Tebuthiuron
Diclofop	Mecoprop	Thiram
Dicofol	Mecoprop	Tralkoxydim
Diethyltoluamide	Mefluidide	Triadimefon
Difenoconazole	Mepiquat	Triadimenol
Dimepiperate	Metalaxyl	Tri-allate
Dimethachlor	Metamitron	Triclopyr
Dimethametryn	Metconazole	Triflumizole
Dimethipin	Methylarsonic acid	Undecan-2-one
Dimethylarsinic acid	Metolachlor	Uniconazole
Diniconazole	Myclobutanil	XMC
	2-Naphthoxyacetic acid	Ziram

### Annexure 3

#### Pest Management Plan

The primary aim of Pest Management Plan (PMP) is to manage pests and diseases that may negatively affect production of crops so that they remain at a level that is under an economically

damaging threshold. Pesticides should be managed to reduce human exposure and health hazards, to avoid their migration into off-site land or water environments and to avoid ecological impacts such as destruction of beneficial species and the development of pesticide resistance. PMP consists of the judicious use of both chemical and nonchemical control techniques to achieve effective and economically efficient pest management with minimal environmental contamination. PMP therefore may include the use of:

Mechanical and Physical Control

Cultural Control

Biological Control, and

Rational Chemical Control

Non Chemical Pest Management:

The pest management will be restricted the methods of mechanical, physical, biological methods unless chemical methods are highly desired. The key methods to be followed are:

Selection of pest resistant varieties recommended for the state

Crop rotation to reduce the presence of insects, disease, or weeds in the soil or crop ecosystems

Support beneficial bio-control organisms such as insects, birds, mites, and microbial agents to perform biological control of pests (e.g., by providing a favorable habitat, such as bushes for nesting sites and other original vegetation that can house pest predators and parasites)

Favor manual, mechanical weed control and/or selective weeding

Using mechanical controls such as traps, barriers, light, and sound to kill, relocate, or repel pests.

The non chemical methods will also include the promotion of the following plant and animal based preparations as pesticides and growth promoters which are proven to be effective.

Seed treatment with Beejamrutha to offer protection from pathogens, pests and promote good germination (a mixture of cow dung, cow urine, water, lime and handful of soil)

Application of GhanJeevamrutha – culture of micro organisms to improve nutrient availability to the crop (a mixture of cow dung, cow urine, jiggery, gram flour and soil - preferably from forest)

Plant protection by natural pesticides like Agni Astra, Brahma Astra, Neem Astra

Agni Astra: prepared by boiling and fermenting chillies, garlic, tobacco and neem leaves in cow urine.

Brahma Astra: prepared by boiling and fermenting leaves of neem, milk weed, datura, arjun, gilory, karanj and guava in cow urine.

Neem Astra: prepared by adding neem leaf extract in cow dung and urine.

### **Pest Management Plan:**

IPM is the combined use of multiple methods mentioned above to prevent or suppress pests in a given situation. Although IPM emphasizes the use of nonchemical strategies, chemical control may be an option used in conjunction with other methods. In cases where chemical methods are adopted, it will be in compliance with the OP 4.09, i.e. the pesticides falling under classes 1a, 1b and II will be excluded (Annexure 11 of Volume 1). Integrated pest management strategies will depend on surveillance to establish the need for control and to monitor the effectiveness of management efforts. Pest surveillance is an effective tool as an information system, which renders pest control methods more effective. It aims at monitoring and forewarning of likely buildup of pests in order to facilitate planning and adoption of suitable control strategy based on ETL. The project will make the necessary arrangements and will provide the trainings for the ECPs on the same.

The following precautions will be ensured under IPM practices:

### **Pesticide Application**

In cases where the pesticide application is justified, then the beneficiaries will be oriented on the following actions:

The personnel will be trained to apply pesticides with all necessary precautions during mixing, applications, washing of the sprayers, disposal of spray equipment etc.

Review and follow the manufacturer's directions on maximum recommended dosage or treatment as well as published reports on using the reduced rate of pesticide application without loss of effect, and apply the minimum effective dose

Avoid routine "calendar-based" application, and apply pesticides only when needed and useful based on criteria such as field observations, weather data (e.g. appropriate temperature, low wind, etc.),

Avoid the use of highly hazardous pesticides, particularly by uncertified, untrained or inadequately equipped users. This includes:

Pesticides that fall under the World Health Organization Recommended Classification of Pesticides by Hazard Classes 1a, 1b and II should be avoided in all cases and class III to be used only when no practical alternatives are available and where the handling and use of the products will be done in careful manner to avoid affects on health and environment

Use only pesticides that are approved by the WHO, that are slightly hazardous (Class III) and are unlikely to present acute hazards (Class IV) Annexure 11 of Volume 1. Use only pesticides that are manufactured under license and registered and approved by the appropriate authority and in accordance with the Food and Agriculture Organization's (FAO's) International Code of Conduct on the Distribution and Use of Pesticides;

Use only pesticides that are labelled in accordance with the national and international standards and norms

Avoid use of pesticides that have been linked to localized environmental problems and threats

Maintain and calibrate pesticide application equipment in accordance with manufacturer's recommendations. Use application equipment that is registered in the country of use

Establish untreated buffer zones or strips along water sources, rivers, streams, ponds, lakes, and ditches to help protect water resources

### **Pesticide Handling and Storage**

Improper pesticides handling and storage may lead to contamination of soils, groundwater, or surface water resources, due to accidental spills during transfer, mixing etc. The following measures will be taken to avoid the issues. The Enterprises will be trained in handling and storage of pesticides especially on the following:

Storage of pesticides in their original packaging, in a dedicated, dry, cool and well aerated location that can be locked and properly identified with signs, with access limited to authorized people. No human or animal food may be stored in this location. The store room should also be designed with spill containment measures and sited in consideration of potential for contamination of soil and water resources

Purchase and store, no more pesticide than needed and rotate stock using a “first-in, first-out” principle so that pesticides do not become obsolete. Additionally, the use of obsolete pesticides should be avoided under all circumstances; a management plan that includes measures for the containment, storage and ultimate destruction of all obsolete stocks to be prepared by the enterprises (in accordance to guidelines by FAO and consistent with country commitments under the Stockholm, Rotterdam and Basel Conventions).

Operators must read, understand, and follow product label directions for safe mixing, application, and disposal; farmers/labours applying pesticides to be trained on critical operations (e.g., mixing, transfers, filling tanks, and application).

Mixing and transfer of pesticides should be undertaken in ventilated and well-lit areas, using containers designed and dedicated for this purpose

Use of Personal Protective Equipment (PPE) such as gloves, overalls, eye protection worn at all times when handling and applying pesticides.

Mixing and filling the pesticides should be done away from watercourses and drains.

Spray operation should be done in early mornings and evenings, avoid spraying on cloudy day or a windy day/direction of wind.

Rinsed water should be collected in a separate tank and disposed of as a hazardous waste, spills should be cleared. The spray equipment and containers should not be washed in water courses and drains

Collect rinse water from equipment cleaning for reuse (such as for the dilution of identical pesticides to concentrations used for application);

Empty pesticide containers should not be used for any other purpose (e.g. storing food, water containers). Contaminated containers should be handled as hazardous waste, and should be disposed safely

Expired chemicals should be disposed off immediately

Maintain records of pesticide use and effectiveness

Shower or bath at the end of every day's work and wear new clean clothes.

Wash overalls and other protective clothing at the end of every working day in soap and water and keep them separate from the rest of the family's clothes. If the insecticide touches the skin, wash off immediately with soap and water.

Change clothes immediately if they become contaminated with pesticides. Inform the supervisor immediately if one feels unwell.

In case of accidental swallow or exposure to the spray or pesticides the first aid should be administered immediately and medical help should be sought immediately



# BE SAFE !

## Proper Handling of Pesticides

### Preliminary Field Assessment



- Identify the pest and ascertain the damage done
- Use pesticide only if it has exceeded the ergonomic injury level
- Use only the recommended pesticides, which is the least toxic

### Use of Proper Equipment and Quality Check



- Read instructions manual of the pesticide and equipment
- Check the spraying equipment and accessories, which are to be used
- Ascertain that all components of equipment are clean, especially filling and suction, strainer, sprayer tank, cut off device and nozzle
- Replace worn out parts such as 'O' ring, seal, gasket, worn out nozzle tip, hose clamps and valves
- Test the sprayer and ascertain whether it pumps the required output at rated pressure

### Equipment Calibration



- Calibrate the sprayer
- Set sprayer speed and nozzle swath by adjusting spray height and nozzle spacing

### Use of Protective Gear & Personal Hygiene



- Make sure that appropriate protection clothing is available and is used
- Train all concerned with the application, and understand the recommendations
- Ensure that soap, towel, and plenty of water is available

### Proper Storage



- Pesticide should be kept in dry place and in locked storage

### First aid measures for pesticide poisoning

- In case of skin contact, remove contaminant contacts and wash with clean water
- In case of inhalation, remove from site and provide good clean air site, keep the head and shoulder upright
- In case of becoming unconsciousness and breathing stops, provide artificial respiration.
- If pesticide is swallowed, induce vomiting by giving 2-3 litres salt water. Give milk after this
- Take the patient to doctor at the earliest, and take the container along with patient



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