

Approved crop protection chemicals and biological agents; integrated insect pest, disease, weeds and crop management methods;

Seed Enterprises Management Institute

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SEMI's FIELD PESTS AND DISEASE DIAGNOSIS IN SEED CROPS

Outline

- Why approval?
- Key international agreements
- What is common among them
- How they support chemical management
- Laws, regulation and standards that control pesticide usage
- Concerns about pesticide use
- Restricted products
- Seed treatments
- IPM

Why approval?

- Pesticides used are approved for use after undergoing various checks guided by the law of the land.
- There are regulations that guide the, manufacture, formulation, importation, packing, distribution and sale
- The scientific information, effect, value, safety and quality of a pesticide must be affirmed by a regulator and registered before the product can be distributed for use in a country

Key international agreements on pesticides

Common thread among them

- Reduce harm to human health and environment
- Support pesticide management (labelling, trade and movement, Identification of alternatives)
- Provide information about pesticides (hazards associated with them)
- List of banned and restricted pesticides

Key international agreements on pesticides

They are:

- **Stockholm convention: Persistent organic pollutants (POPs) -dirty 12**
 - Chemicals that do not break down easily, stay long in environment and can move long distances
 - they bioaccumulate and biomagnify
- **World health organization (WHO) classify pesticides according to the level of toxicity and the hazard that may be caused**
 - Classified pesticides into I (R),II (Y) ,III (B) and IV (G)
 - Red highly hazardous (cause acute poisoning)
 - Highly hazardous pesticides to human health and environment are Restricted pesticides

Key international agreements on pesticides

- Rotterdam convention: Prior informed consent
 - Country intending to import must be informed of every danger and goodness alike about the product so that it can make a decision' It covers 33 pesticides and 11 industrial chemicals
- Montreal protocol: Chemicals that emit gas that is destroying the ozone layer must be managed
 - e.g methyl bromide (2015) and various fumigants
 - Refrigeration gases, foam foaming, industrial cleaning, fire safety (even gas released from animal rumen)

Laws, regulations and standards

- These concern the use of chemicals under certain conditions and if they are not met, produce will not be marketed where these laws and regulations operate
- E. g. European Union market, UK, US German, Japan e.t.c
- Some local markets (Supermarkets)
- In Africa, there are steps towards harmonizing the rules and regulations

Standards (more for horticulture)

- Have sets of rules of production of a certain produce. They have to be met for the produce to obtain market in the area where the rules prevail. Rules take care of these concerns:
- Good agricultural practices- include keeping records about what has been used and when? Critical for chemicals where one has to indicate why it was used
- Traceability
- Workers health
- Safety for the workers in the field and when packing
- Environmental protection to ensure sustainability

Concerns about pesticide dependence

- **Pest resistance**
- **Environmental persistence**
- **Bioaccumulation:** when a chemical accumulates in animal fat (historical fact)
- **Biomagnification:** when an organism accumulates residues at higher concentrations than the organisms they consume

Concerns about pesticides and the hazards in the environment

- US Environmental Protection Agency (EPA) created in 1970
- Charged with protecting environment and health of humans and animals
 - DDT banned in 1972
- Public concern has led to stringent regulation of pesticides, as well as changes in types of pesticides used



Internationally restricted pesticides



2,4,5-T and its salts and esters	Chlormephos	Fenamiphos	Oxydemeton-methyl
3-Chloro-1,2-propanediol	Chlorobenzilate	Flocoumafen	Parathion
Acrolein	Chlorophacinone	Flucythrinate	Paris green
Alachlor	Coumaphos	Fluoroacetamide	Pentachlorobenzene
Aldicarb	Coumatetralyl	Formetanate	Pentachlorophenol and its salts and esters
Aldrin	Cyfluthrin	Furathiocarb	Perfluorooctane sulfonic acid
Allyl alcohol	DDT	Hexachlorocyclohexane (HCH)	Phenylmercury acetate
Alpha hexachlorocyclohexane	Demeton-S-methyl	Heptachlor	Phorate
Azinphos-ethyl	Dichlorvos	Heptenophos	Phosphamidon
Azinphos-methyl	Dicofthophos	Hexachlorobenzene	Propetamphos
Binapacryl	Dieldrin	Isoxathion	Sodium arsenite
Beta hexachlorocyclohexane	Difenacoum	Lead arsenate	Sodium cyanide
Beta-cyfluthrin	Difethialone	Lindane	Sodium fluoracetate
Blastidicin-S	Dinitro-ortho-cresol (DNOC)	Mecarbam	Strychnine
Brodifacoum	Dinoseb	Mercuric chloride	Sulfotep
Bromadiolone	Dinoterb	Mercuric oxide	Tebupirimfos
Bromethalin	Diphacinone	Mercury compounds	Tefluthrin
Butocarboxim	Disulfoton	Methamidophos	Terbufos
Butoxycarboxim	Dustable powder containing a combination of benomyl at or above 7% carbofuran at or above 10% and thiomyl at or above 15%	Methidathion	Thallium sulfate
Cadusafos	EDB (1,2-dibromoethane)	Methiocarb	Thiram
Calcium arsenate	Edifenphos	Methomyl	Thiofanox
Calcium cyanide	Endosulfan	Methyl bromide	Thiometon
Captafol	Endrin	Methyl-parathion	Toxaphene
Carbofuran	Ethyl p-nitrophenyl phenylphosphorothioate (EPN)	Mevinphos	Triazophos
Chlordane	Ethiofencarb	Mirex	Tributyl tin compounds
Chlordane	Ethoprophos	Monocrotophos	Vamidothion
Chlordimeform	Ethylene dichloride	Nicotine	Warfarin
Chlorethoxyfos	Ethylene oxide	Omethoate	Zeta-cypermethrin
Chlorfenvinphos	Famphur	Oxamyl	Zinc phosphide

No to restricted products!

- Pesticides subject to international restrictions should not be used to protect seed fields or protect seeds for sale
- Those that are in Class Ia and Ib restricted by WHO they should only be handled by trained and registered people
- Persistent organic pollutants
- Ozone depleting substances and
- Pesticides that require prior informed consent for movement

Seed Treatments

- Chemicals are used to reduce attack from pest and disease and to prevent pests and diseases from attacking **BUT**
- Use only the chemicals that do not fall within those regulated by the international agreements or banned
- seeds are mainly treated with thiram, captan, mancozeb, carbendazim, captafol, metalaxyl e.t.c. at 2-4g/Kg
- Some combination products such as carbendazim with pyroquilon or tricyclozole are also used
- Captan-a widely used broad spectrum contact fungicide, however, poor on pythium and is very dusty.
- Metalaxyl-Narrow spectrum systemic fungicide with excellent activity against Pythium.

Seed treatments

- Fludioxonil-broad spectrum contact fungicide, very effective against Fusarium, but poor Pythium activity.
- Thiram only that product with less than 15% qualifies for use, anything above should not be used
- Benomyl any product with more than 7% should not be used
- - Monceren GT: a combination product - a mix of insecticide and fungicide Imidacloprid 233g/L + Pencycuron 50g/L + Thiram 107g/L
- Apron star: A combination product (imidacloprid(20g/Kg)+ metalaxyl (20g/Kg) + difenoconazole (2g/Kg))
- Celest Top: Thiamethoxam 262.5g/L + Fludioxonil 25g/L +Difenoconazole 25g/L

Seed treatments

- Chloropyrifos or monocrotophos or phosalone at 4ml/kg are used as a precaution against early season insect pests
- Imidacloprid at 10mls/Kg is also used to protect millets/sorghum against shoot fly incidences
- Clothianidin at 2g/Kg for control of aphids in managing MLN viruses
- *Trichoderma viride* (4g/Kg) or *Pseudomonas fluorescens* (10g/Kg) are organisms used to protect field crops against early season diseases
- During storage seeds may be protected using fumigants such as acrylonitrile (16-20 g/m²), Carbon disulphide (24-32 g/m²), carbon tetra chloride (300-400 g/m²), ethyl bromide (24-30 g/m²), **methyl bromide (32 g/m²)** and phosphine (3-6 g/t of seeds).



SEMI'S UoN

THANK YOU

Seed Enterprises Management Institute

University of Nairobi