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

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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 law of the land.
- There are regulations that guide the manufacture, formulation, importation, packing, distribution and sale.
- The scientific information, effect, value, 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, ID of alternatives)
- Provide information about pesticides (hazards associated with them)
- List 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 the environment and can move long distances
  - They bioaccumulate and biomagnify
- **World health organization (WHO)**
- **Restricted pesticides that are highly hazardous to human health.**
  - Classified pesticides into I (R), II (Y), III (B) and IV (G)
    - Red highly hazardous
Key international agreements on pesticides

- **Rotterdam convention: Prior informed consent**
  - Country intending to import must be informed of everything dangers 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**
  - e.g methyl bromide (2015) and various fumigants
  - Refrigeration gases, foam foaming, industrial cleaning, fire safety (even gas released from animal rumen)
Laws and regulations

- 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. EU
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. 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

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

Use only the chemicals that do not fall within those regulated by the international agreements or banned in the country.

Captan-Widely used broad spectrum contact fungicide, however, poor on pythium and very dusty.

Metalaxyl-Narrow spectrum systemic fungicide with excellent activity against Pythium.

Fludioxonil-broad spectrum contact fungicide, very effective against Fusarium, but poor Pythium activity.

Murtano- a combination product a mix of insecticide and fungicide.
Seed treatments

- 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
Integrated pest management

• IPM: a balanced, tactical approach
• Anticipates and prevents damage
• Uses several tactics in combination
• Improves effectiveness, reduces side effects
• Relies on identification, measurement, assessment, and knowledge
Why practice IPM?

- Maintains balanced ecosystems
- Pesticides alone may be ineffective
- Promotes a healthy environment
- Saves money
- Maintains a good public image
Integrated Pest Management is driven by decisions

1. Identify the pest and know its biology
2. Monitor and survey for pests
3. Set IPM goal: prevent, suppress, eradicate
4. Implement
   1. Select control strategies
   2. Timing
   3. Economics
   4. Environmental impacts
   5. Regulatory restrictions
5. Evaluate
THANK YOU