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Federal Democratic Republic: of Ethiopia
MINISTRY OF AGRICULTURE

Few Points on Integrated Pest Management (IPM) and its Contribution to Pesticide Risk Reduction

Stakeholders Meeting on Pesticide Risk Reduction Program in Ethiopia,
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IPM and its Contribution to Pesticide Risk
Reduction

Topics

1. **What is IPM?**
2. **History of IPM,**
3. **Why we worry about pesticides,**
4. **Why IPM and what are its components?**
5. **Initiatives in Ethiopia,**
6. **The flower industry,**
 - **Negative impacts and public concerns,**
 - **Consequences,**
 - **Responses,**
 - **Alternative pest management strategy,**
 - **On-farm trials,**
 - **Results,**
7. **Concluding remarks,**

What is Integrated Pest Management (IPM)?

- ✓ Michael Bacher and Bachon (1952) coined the term Integrated Control,
- ✓ The 1st definition is by Stern, *et. al.* (1959) *i.e.*
 - ✓ “Applied pest control which combines and integrates biological and chemical control”,
- ✓ More than 65 definitions, by different scholars,
- According to FAO (1967) International Code of Conduct IPM is defined:
 - A pest/vector management system that, in the context of the associated **environment** and the population dynamics of the pest species, utilizes **all suitable techniques** and methods in as compatible a manner as possible and maintains **pest populations at levels below those causing economically unacceptable damage or loss**”

History of IPM

- **Follows History of Agricultural Pest Management**
 - A. **Era of Traditional Practice:- up to the year 1938,**
 - 1. **Subsistence phase: no organized crop protection,**
 - B. **Era of Pesticide Use:- from 1939 up to 1975**
 - The era **begins with the discovery of DDT,**
 - 2. **Exploitation Phase**
 - 3. **Crisis Phase**
 - 4. **Disaster Phase**
 - C. **Era of Integrated Pest Management:- from 1976 onwards**
 - 5. **Integrated Pest Control / Management Phase**
 - **Early stage consist only:-**
 - **Only Integration of Biological Control and Chemical Methods,**
 - **Mainly for the control of insect pests;**



Why we worry on Pesticides?

- **Risks associated,**
 - Harmful effect on the,
 - Environment in general,
 - Human health in particular,
 - Effect on International market,
 - Residue,
 - Phytotoxicity,



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Why IPM and What are its Components

- IPM:-
 - Emerged as a reaction to Pest Management Practices,
 - Mainly dependent on use of excessive use of broad spectrum synthetic pesticides (Insecticides) that lead to the problems of:
 - Resistance, Pest resurgence, Secondary pest development and outbreak, Application of increased doses,
 - A “Vicious Circle” that shown sequences of scenarios
 - Poisoning to applicators, non target organisms, reduction in production quality, food poisoning and the environment;
- IPM Components:-
 - Physical,
 - Cultural,
 - Chemical,
 - Biological, etc...;

Initiatives



- **Extension,**
 - **Inclusion of “IPM approach” in:-**
 - **Technology packages preparation,**
 - **On-going/Routine training, advisory services, etc ...,**
 - **On-farm demonstrations,**
 - **Experiences in:-**
 - **Amhara region,**
 - **IPM-FFS in SNNPR,**
- **Advocacy in various forums,**
- **Research on various pest groups including weeds,**
- **Review agricultural projects in line with IPM,**
- **Finance IPM projects,**
- **Promote sustainable pest management in the Flower industry,**



The Flower Industry



- **The Enabling Environment: the Policy,**
 - *i.e.* **Agricultural Development Lead Industrialization is the basis for the rapid development of export focused agricultural development,**
 - This resulted in the improvement of the Horticultural industry in general and the in Floricultural industry in particular,
- **Rapid growth in the Size of flower farms surpassed all other African countries except Kenya,**
 - **The Benefit**
 - Foreign exchange,
 - Employment generation,
 - Introduced an advanced labor intensive production technology

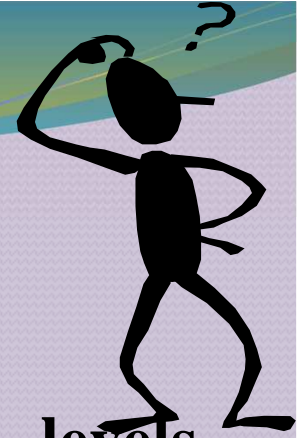


Negative Impacts and Public Concerns

- **With the rapid development of the sector public concerns were growing regarding,**
 - **Labour conditions at the farm,**
 - **Environmental impact,**
 - **Water quality, and over-exploiting of water resources,**
 - **Human health due to the pesticide misuse,**



Consequences



- **Market**
 - Pesticides account for 25% of expenditures,
 - Export increasingly demands low residue levels (certification),
 - Yield reduction (10%) due to phytotoxicity of pesticides,
 - Shortening longevity of plastic cover,
- **Control**
 - Resistance development to pesticides,
 - Leading to pest pressure with associated yield reduction,
- **Image of the sector and workers' health**
 - Complaints from workers and neighbouring farmers,

Response to the Concerns

- **The Ethiopian Government**
 - **Introduced:-**
 - a series of measures designed both to
 - Promote a long-term shift from only chemical control, and
 - Thus moving towards more sustainable forms of pest management,
 - The **Series of Measures** are supported by The Netherlands Government,
 - *i.e.* Under the Ethiopia Netherlands Partnership Programme,



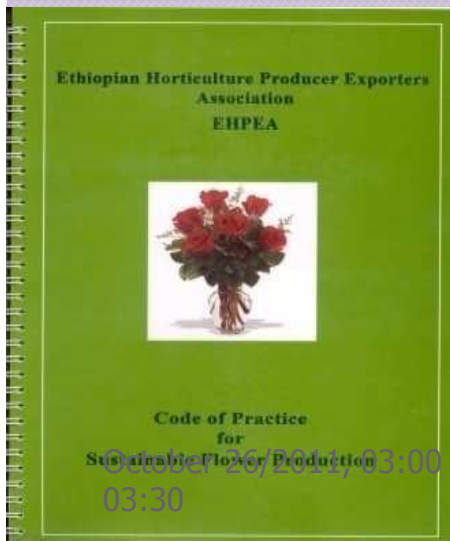
The Initial step

- **The Ethiopian Horticulture Producers and Exporters Association (EHPEA),**
 - has taken the initiative to develop a **Code of Practice,**
 - Including a plan for implementation,
 - **Backbone of the industry and**
 - **Crucial to achieve the aim of Sustainable market and production standard,**
 - **Fulfils the demand of modern consumers,**



Alternative Pest Control Strategies

- Following the development of the **Code of Practice**,
 - Need of an Alternative Pest Control Strategies come to attention,
- An alternative Pest Management Strategy,
 - That brings together various control strategies, and can therefore contribute substantially to realizing the **Code of Practice**,



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Following Activities

- **Preliminary Survey**
 - Conducted in 46 flower farms, 74% Roses,
 - Two spotted Spider Mite, found in all (100 %) farms,
 - Management mainly depend on synthetic pesticides,
 - Due to this, the conventional method *i.e.* is not considered as a sustainable strategy,
 - Alternative Pest Management Strategy considered *i.e.*, IPM,
 - That brings together various control strategies, including “Biological Control”, and
 - Can therefore contribute substantially to realizing the Code of Practice,
 - **On-farm trials** set-up at Ethiopian rose farms is considered as an approach,



On-farm trials

- **Goal,**
 - To investigate the efficacy of biological control under Ethiopian conditions, and
 - To gain grower's acceptance of IPM.
- **Approaches**
 - Public-Private Partnership,
 - Learning by doing
 - Knowledge exchange
 - Experience sharing,
 - IPM alliance meeting,
 - Open field days,
- **Experimental set-up/design,**
 - Strategies/Treatments to be compared for biological control of spider mite include,
 1. *Phytoseiulus persimilis* alone,
 2. *P. persimilis* and *Amblyseius californicus* together,
 3. The conventional practice,

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Results

- Results of the On-farm trial could be expressed in parameters;
 1. Reduction in the population of Two Spotted Spider Mite, *Tetranychus urticae*,
 2. Decrease in the use of pesticides,
 3. Improvement in quality of Export Produce,
 4. Increase in number of stems,
 5. Confidence built on IPM,



Reduction in the population of Two Spotted Spider Mite, *Tetranychus urticae*,

- Although the progress in time has been different at each farm,
 - Predatory mites have **demonstrated their ability to control spider mite under Ethiopian conditions**
- Summary of observations
 - **Rose crop is clean of spider mite** in case of biological pest management,
 - Spider mite presence in the biological treatments is **(close to) zero**,
 - **But strongly infected in case of chemical pest mgmt.,**
 - Whereas the spider mite presence in the conventional treatment (with chemical spraying) is up to 100%,

Reduction in the population of Two Spotted Spider Mite, *Tetranychus urticae*

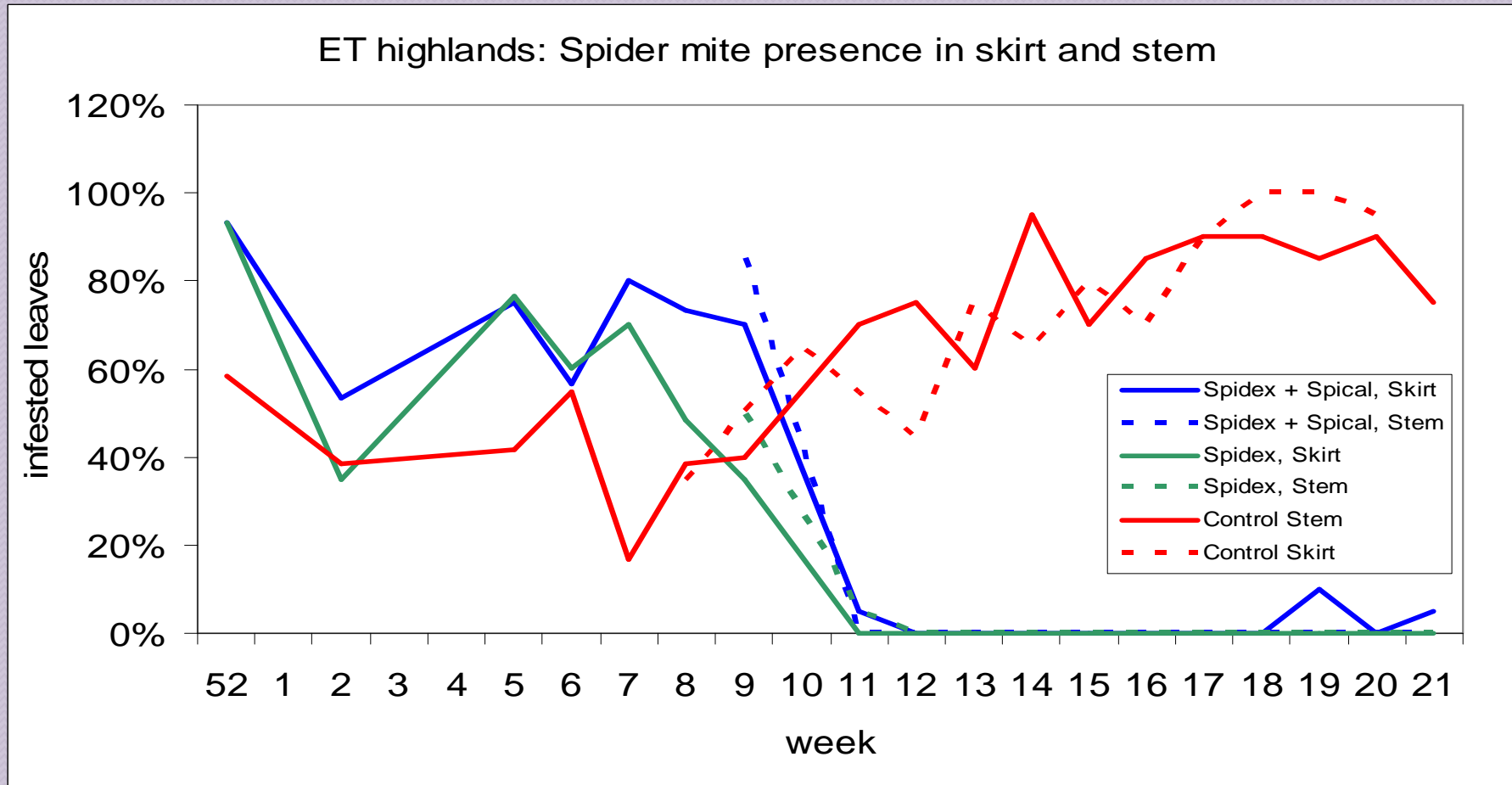


Fig. Population development of spider mite in IPM house and control house in skirt respectively skirt and stem at E. T. Highland Flora

Decrease in the use of pesticides

- In the IPM green houses,
 - Use of strong pesticides stopped,
 - Compatible acaricides sprayed during predators establishment period,
 - Cost of pesticides minimized,
- In conventional green houses,
 - The usual calendar spray of strong pesticides continued,

Improvement in Quality of Export Produce

- **Crop with yellowing symptoms under chemical treatment,**
- **Completely green crop and crop height higher, just as production and product quality,**



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Increase in number of stems

- Crop response to less or chemical sprays and biological spider mite control,
 - Is already clearly visible in the ongoing trials,
 - **Number of stems** per msq increased on the IPM GH compared with conventional chemical control,
 - In addition, **stem length increases**,
 - Longer stem length can give a higher price per stem in the market,



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List of some of BCA used in Various Horti. Crops and size of farm under IPM (Biological control)

Host name	Name of the pest (Common and Scientific)	Biological Control Agent (BCA)	Farms using the BCA (no)	Farm Size (ha)
Rose	Two spotted spider mite (<i>Tetranychus urticae</i>)	<i>Phytoseiulus persimilis</i> <i>Amblyseius californicus</i>	14	339.6
Herbs	White flies and thrips (<i>Trialeurodes vaporariorum</i> ; <i>Bemisia tabaci</i>)	<i>Eretmocerus eremicus</i>	1	4
Rose	Crown gall (<i>Agrobacterium tumefaciens</i>)	<i>Agrobacterium radiobacter</i>	8	21.5
Rose	Botritis	<i>Trichoderma harzianum</i>	1	47.8
Pensotia	Whitefly	<i>Encarsia formosa</i> <i>Macrolophus caliginosus</i> ,	1	3
3	5	7	25	415.9 (39.1%)



Concluding Remarks

- ❖ IPM is an option to minimize Risks associated with pesticide use,
- ❖ The various initiatives to introduce, verify and implement IPM should be strengthened,
- ❖ IPM should strengthened in open field horticulture crops,
- ❖ Current tendency of farms towards IPM components in a variety of ways including pheromones, traps, bio-pesticides, seed dressing, etc ... should be appreciated,
- ❖ Mass production of predatory mite (*Phytoseiulus persimilis*) for a self sustained and wider use at cheaper cost should be encouraged,





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Thank you!