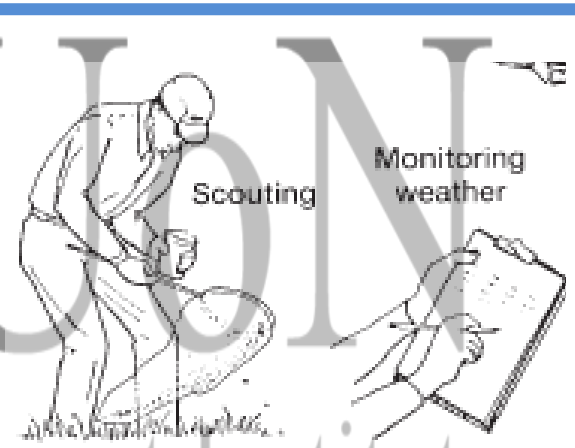
SEED ENTERPRISE MANAGEMENT INSTITUTE (SEMIs)

Seed Production Field Diagnostics Short Course

22nd – 27th June 2015

Criteria for Selecting Appropriate Pest Management Options



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Introduction

- Crop pests contributes to over 30% of crop losses—food security
- Crop pests presents serious challenges in attaining the quantity and quality
- Numerous strategies are used to manage pests –mainly single pronged
- There has been over reliance in the use of pesticides
- Traditional pest control involved routine application of pesticides

Pest Management Tactics

i. Biological - Parasites, predators

ii. Chemical - Pesticides, pheromones, baits

iii. Cultural - Rotation, planting date, site selection, fertility, pH, plant populations, sanitation

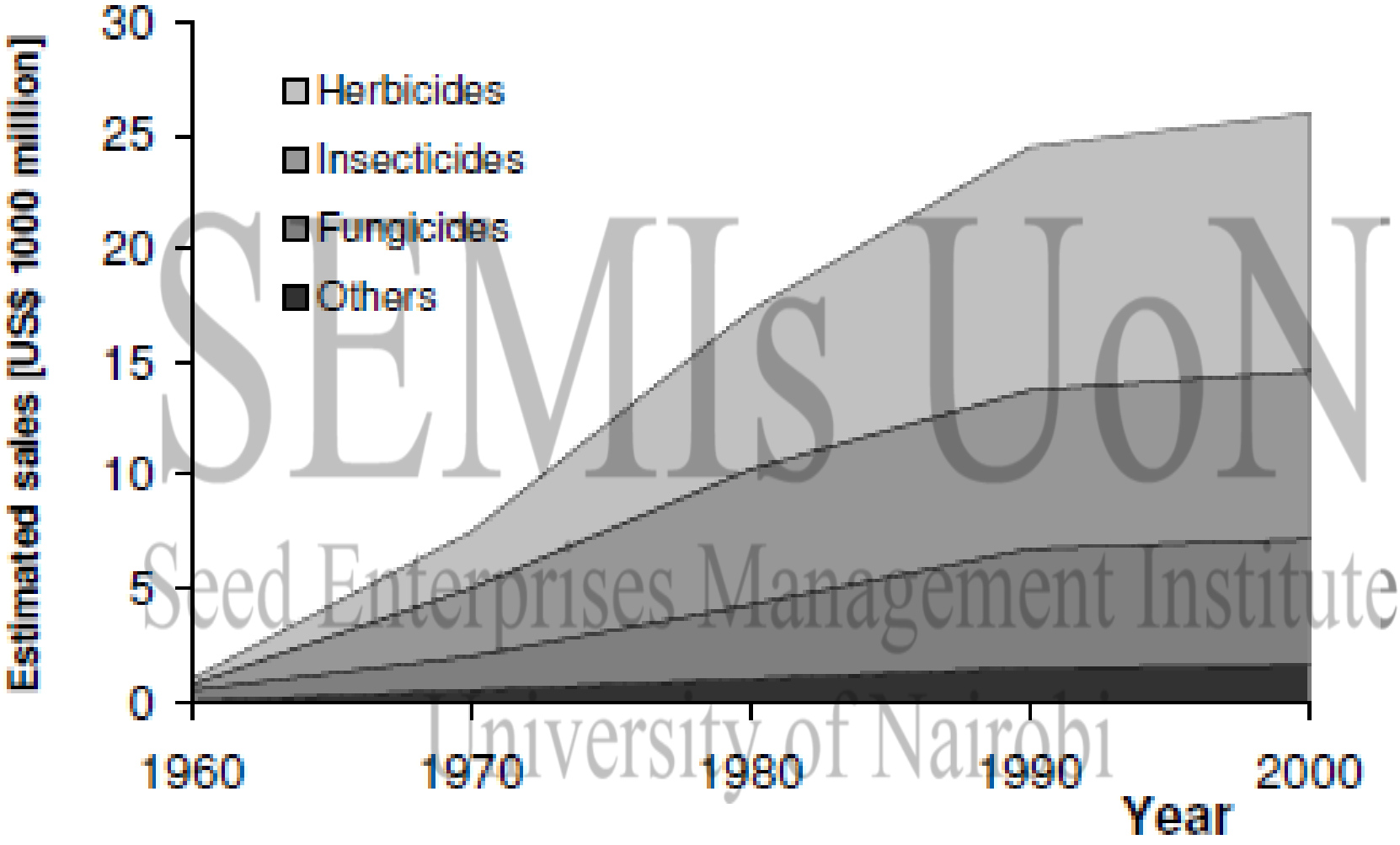
iv. Host Resistance - Resistant Varieties, Transgenic Crops

v. Mechanical/physical - tillage, traps, Screen, heat, hand picking, smoke

vi. Therapy

Trends in pesticide use

There has been an increasing trend in use of pesticides



Problems/shortcomings with pesticides

*Economic and energy costs

*Resistance to pesticides

*Disruption of natural control

*Target pest resurgence

*Induced secondary pest outbreaks

*Human health hazards - acute and chronic effects - user and consumer risks

*Environmental pollution and effects on wildlife

*Effects on pollinators

Selection of Optimal Pest Control Tactics

Bottom line: Options for minimizing economic, health and environmental risks.

- Easy to carry out safely and effectively/least hazardous
- Most cost-effective in the short and long term
- Opportunities to integrate with other strategies
- How the control option fit into the total management system
- Impact of selected strategy on other pests & natural enemies.
- Appropriate to the weather, soils, water, and the energy resources of the site.

•No single strategy has all these attributes
•Hence the need to integrate various strategies in an IPM approach

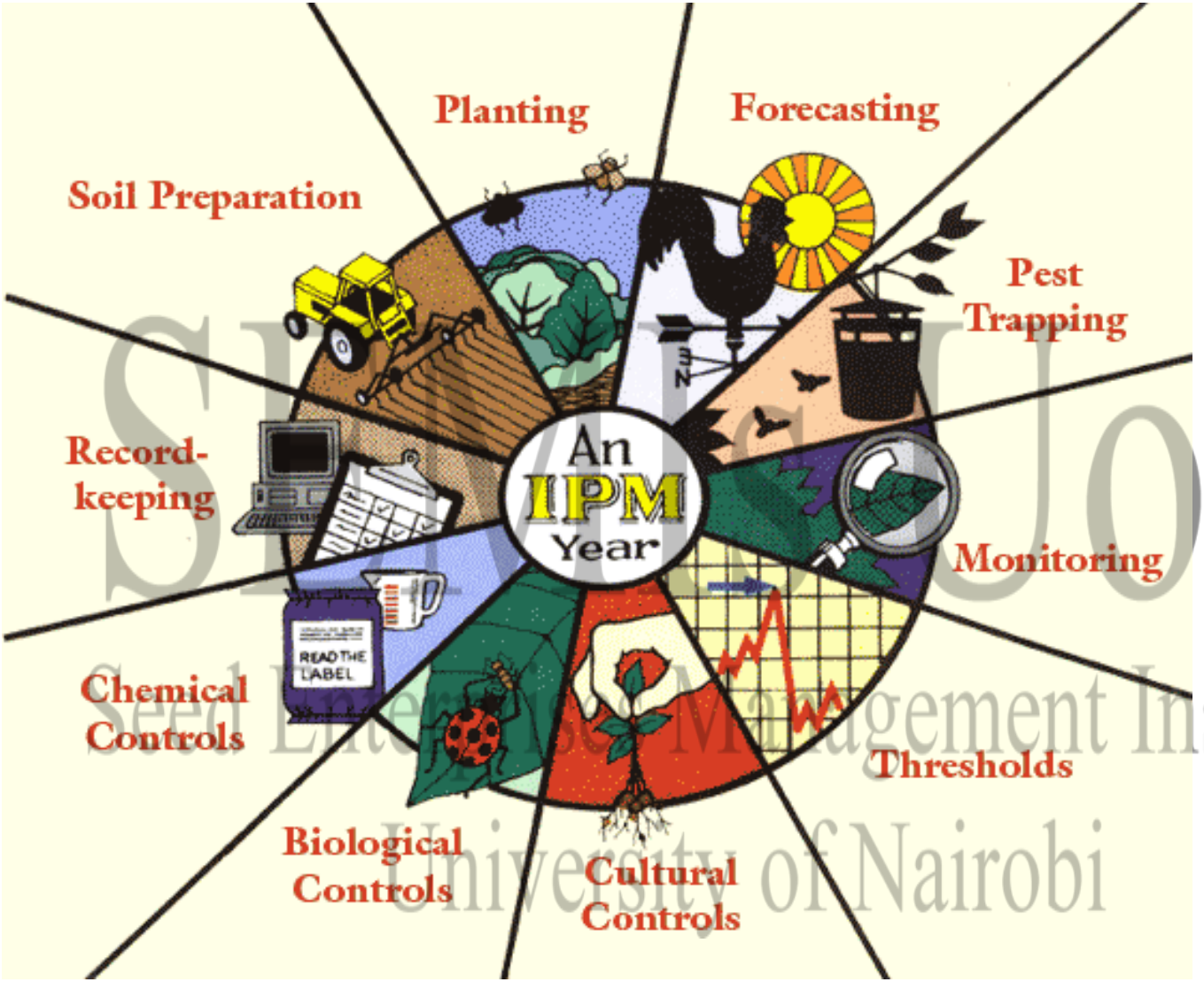
Definition of IPM

•A sustainable approach to manage pests by combining biological, cultural, physical and chemical tools in a way that minimizes economic, health and environmental risks

•IPM

IPM takes advantage of all appropriate pest management strategies, including the judicious use of pesticides.
involves integrating multiple control methods based on site information obtained through: Inspection, monitoring and reports.

Components of IPM programme



Goals of IPM

1. Increase Farm Profitability (increase net profit)
2. Improve Environmental Quality
3. Improve Public Image of Agriculture

Increase Farm Profitability (increase net profit)

*Prevent or avoid crop and pest problems before economic losses occur.

*Eliminate crop input expenses by avoiding unnecessary management actions.

*Improve the efficiency of management actions by adopting better application practices.

Improve Environmental Quality

*Judicious use of pesticides and fertilizers based on identified needs.

*Use selective chemicals or application methods where possible to reduce risk to non-target organisms.

Improve Public Image of Agriculture

*Far-reaching “side benefits” of reducing further regulatory and societal restrictions on the use of pesticides.

- Pesticide residues caused safety issues, affecting the public's consumer confidence and industrial development.

Underlying Principles of IPM

1. The **management unit is the agro-ecosystem -** basis of the systems or holistic approach to IPM

2. **Any pest exists at some tolerable level** – this notion forms the basis of the economic injury level concept.

3. **Natural control factors regulate pest populations and are maximized** in IPM as the primary means of management; if this strategy fail to maintain pests below economic levels, then pesticides in combination with other tactics are used as a last resort.

4. **Less than 100% control is desirable to leave a permanent pest residue** for natural enemies.

Steps in the Implementation of IPM

1. Correct pest Identification
2. Understanding of pest and crop dynamics
3. Planning Preventive Strategies
4. Monitoring
5. Decision making/selection of Optimal Pest Control Tactics
6. Implementation
7. Evaluation

Correct pest Identification

Type of pests and stages are causing the damage. This is foundation of all decision making

Understanding of pest and crop dynamics

*When does the pest inflict feeding injury?

*How much injury is tolerable?

*What are the expected losses of the pest if controls are not used?

*What is the most vulnerable stage for management?

Planning Preventive Strategies

•Prevention is the first step to avoid a pest becoming a threat

•Careful examination of field history and all aspects of crop production system:

* Manipulation of cropping practice to reduce pest attack - time of planting, crop rotation, or tillage

*Are the chances of economic pest losses great enough to justify a preventive pesticide strategy?

*What are the existing natural control agents that can be augmented or conserved?

Monitoring

•Periodic assessment of pests, natural control factors, crop characteristics, and environmental factors:

•Monitoring ensures control strategies are applied when really needed

<u>It involves</u>

- Sampling
- Field scouting to make visual counts or assessment of damage
- Use of trapping devices (pheromone traps, light traps).

Decision making

Evaluation of the economic benefits and risks of pest management actions.

- Potential losses or benefits in absence or presence of control measures
- *Presence of natural control agents to reduce the pest population below economic levels
- *is the damage potential of the pest more costly than the cost of control?
- Determine the “economic threshold" or "action threshold" for specific crop growth stage or set of crop conditions.

Implementation

Timely deployment of the management options with precision and completeness.

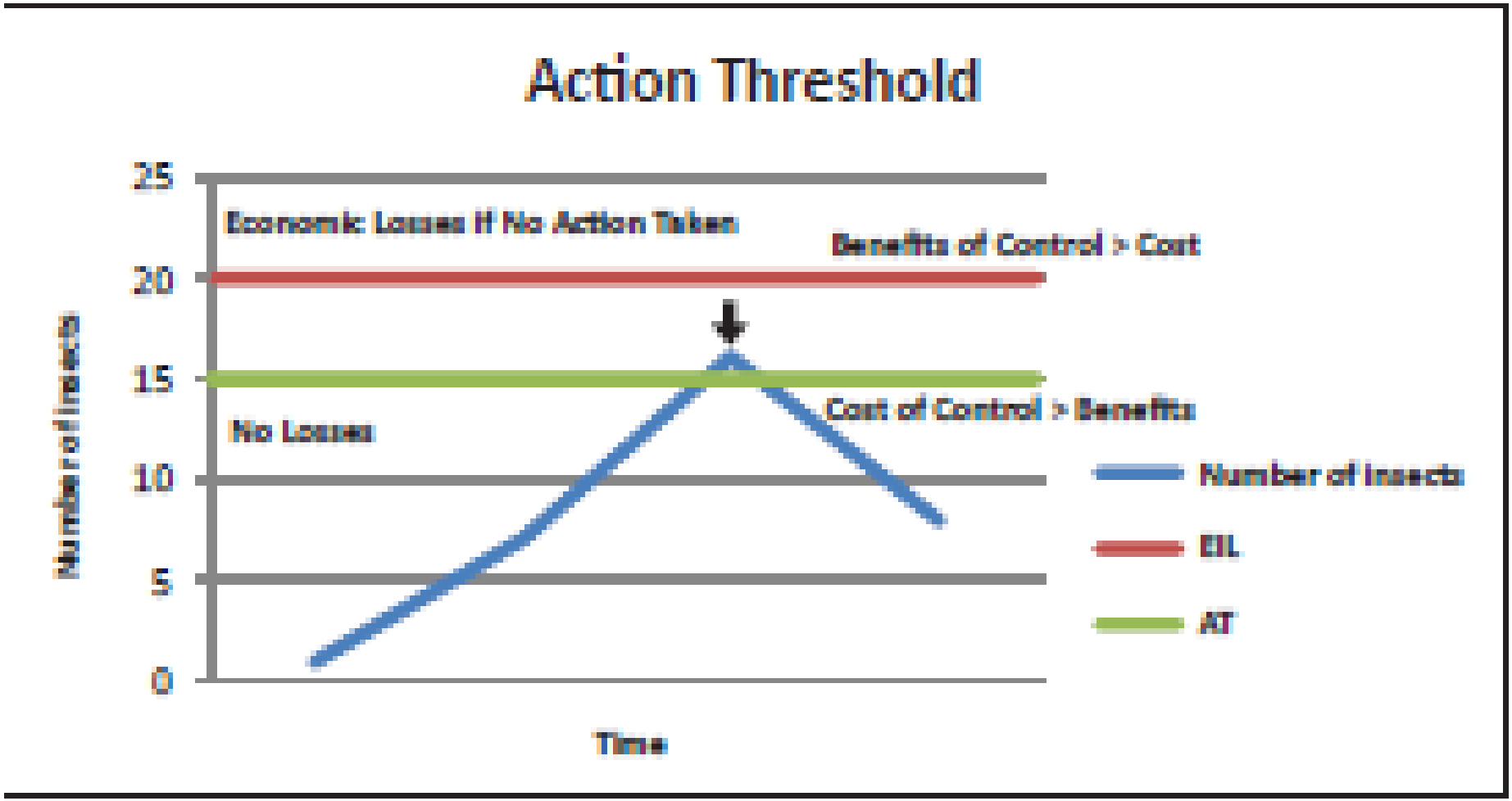
- Maximum effectiveness of the management tactics
- Proper calibration and working condition of the pesticide application equipment
- Use of appropriate pesticide rate for the target pest
- Minimum disruption on natural enemies while still maintaining effective control.

Evaluation of the selected pest control options

- Was the choice of control action appropriate?
- Was the management action implemented on time and according to recommendations?
- What changes to the management tactics can be made to improve control if the same pest problem occurs in the future?
- What future changes in the production system can be made to achieve more permanent suppression of the pest problem?

Use of the Economic Threshold in IPM

- Complete control of pests is neither necessary for maximum yields nor appropriate for IPM.
- Crops can tolerate a certain amount of pest damage without appreciable effects on vigour & yield.
- **Economic injury level**: It is the pest population that inflicts crop damage greater than the cost of control measures. EIL level is the *pest* population density that will result in *economic damage*.
- **Action threshold**: The point at which management actions should be taken to prevent an increasing pest population from exceeding the economic injury level.
- The ET always represents a pest density or level of pest damage lower than the EIL.



To conserve beneficial organisms:

- preserve habitat and alternate food sources for beneficials (farmscaping)
- learn to distinguish beneficial insects from pests
- minimize broad spectrum pesticide applications
- use selective pesticides that are less toxic to beneficials
- treat only those portions of the field where pests cause economic levels of damage.

These natural controls often work more slowly than pesticides, but they can be effective, environmentally friendly , and economically sustainable.

Conclusion

Despite of the importance of IPM in sustainable pest management adoption is still low due to

i) Lack of knowledge
ii) High cost of implementation
iii) Slow nature in achieving desired control
iv) Ready availability of pesticides from agrochemical companies

IPM is the way to go for effective, safe and sustainable way of managing the crop pests

End of the presentation

Thanks