

BASECO –
A MICROBIAL BIOCONTROL
FOR GRAPEVINE MEALYBUGS

ABIM, LUCERNE, 2012.
OCTOBER 22 – 24, 2012.

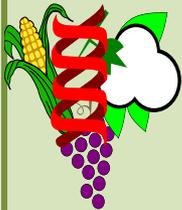
KETAN K. MEHTA
Ecosense Labs. (I) Pvt. Ltd.

THE PAST 100 YEARS IN CROP CARE

How Perceptions changed along the way :

Pest Eradication > Pest Control > Pest Management
> IPM > Resistance Management > Residue
Management > Food Safety > Sustainable
Agriculture > Bio-Tech > GM Crops >

WHAT NEXT ?



AGRICULTURE BUZZWORDS THIS DECADE



BIO-CONTROLS

CARBON SEQUESTRATION

CARBON FOOTPRINT

CLIMATE CHANGE

BIO-FERTILISERS

I N M

WATER SECURITY

GM CROPS

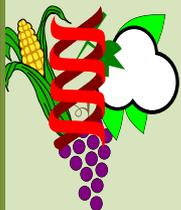
SEED CARE

BIO-FUELS

FOOD SECURITY

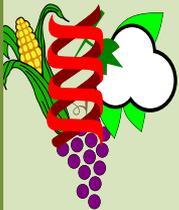
SOIL HEALTH

AGROCHEMICAL LEACHATES/ DRIFT



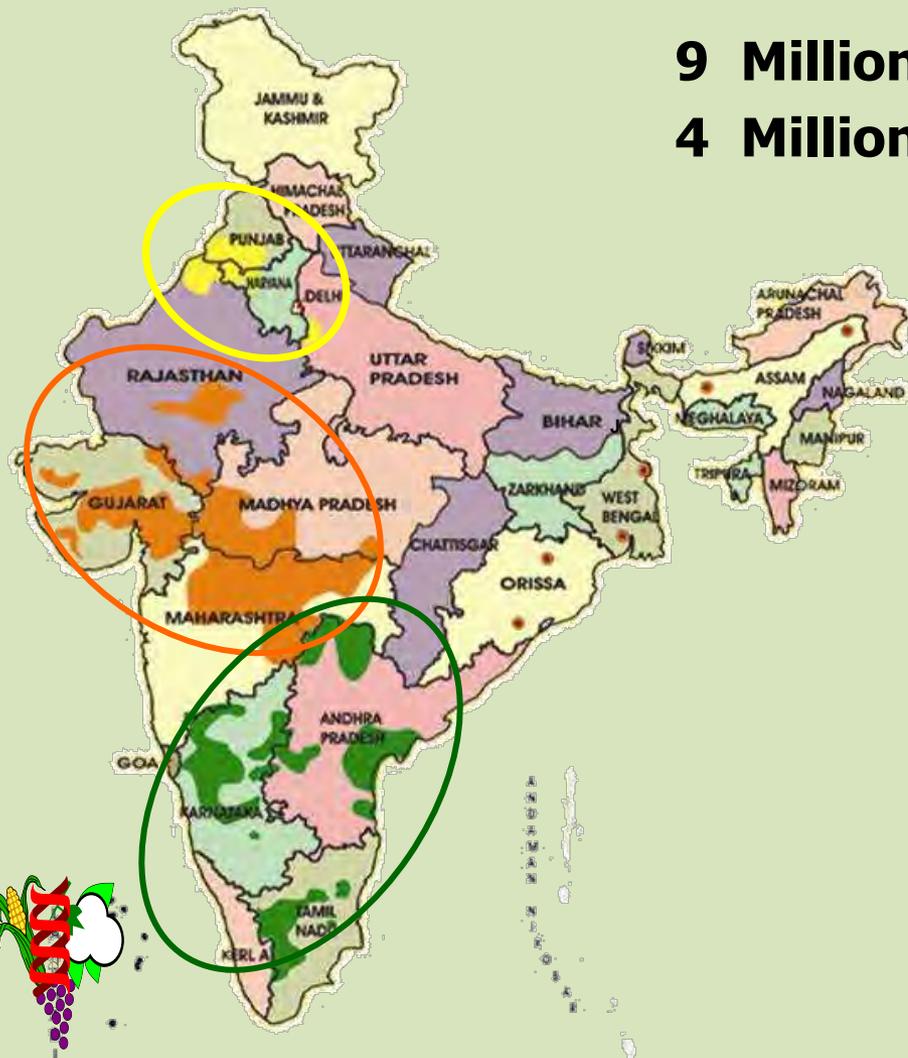
STRUCTURE OF PRESENTATION

- PEST/ INSECT SHIFT IN INDIA
- Bio-Insecticide - *Beauveria brongniartii*
 - i) Structure, Mode of Action, Metabolites
 - ii) Field Trial Results
- Biologicals - An Emerging Market.



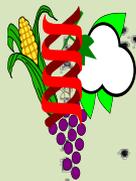
INDIAN CROP PROTECTION SCENARIO

9 Million Ha
4 Million Farmers



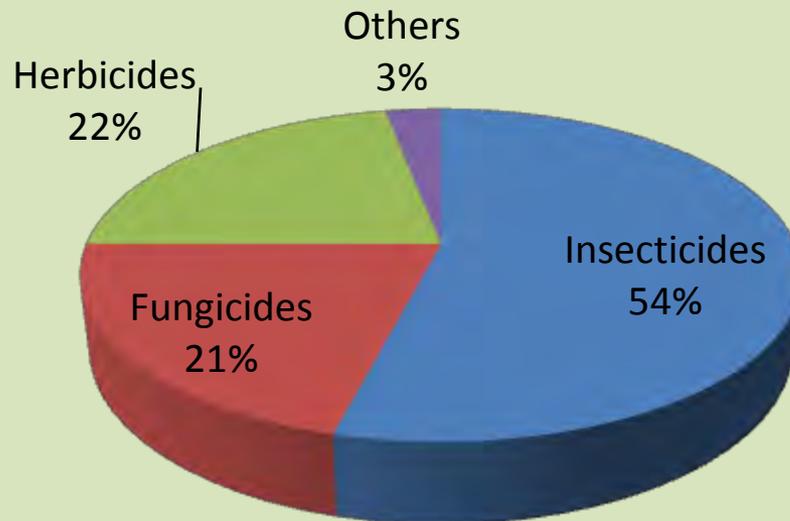
50% of total pesticides are used on cotton which occupies only 5% area

24,000 MT are used in Cotton for Insect control

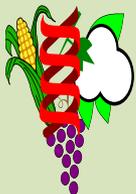
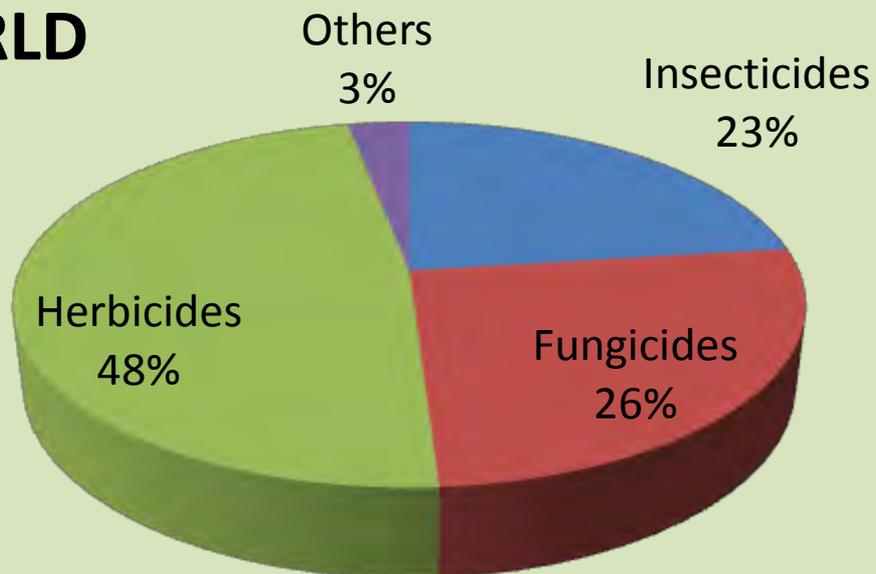


CROP PROTECTION MARKET 2010-11

India

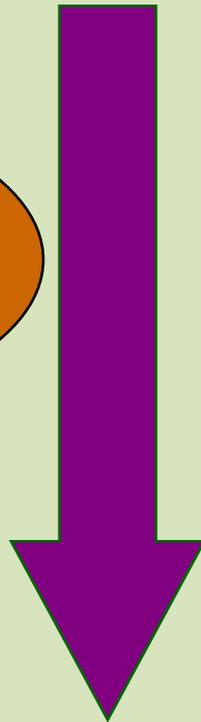


WORLD

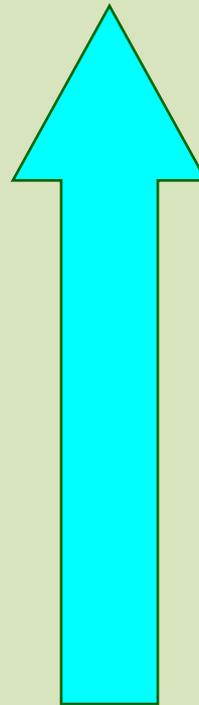


Pest / Insect shift in *India*

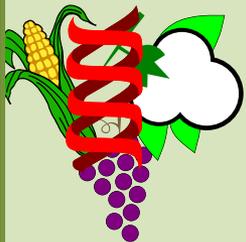
Helicoverpa
Erias
Pectinophora



Thrips, Jassids,
Mealybug & Whitefly

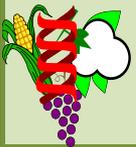
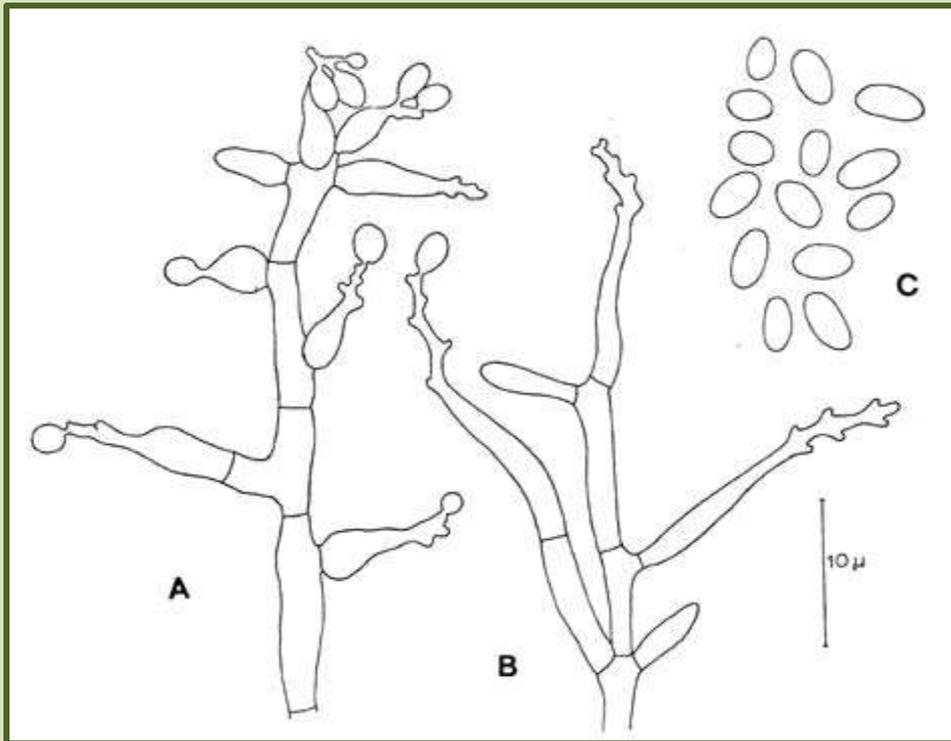


Spodoptera
Mites
Aphids
Red & Dusky Bugs
Stink bug
Ash weevils
Stem borer



MORPHOLOGY OF BASECO

BASECO – A NATURALLY OCCURRING ENTOMOPATHOGENIC SOIL FUNGI.



MODE OF ACTION

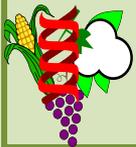
IN HUMID CONDITIONS BEAUVERIA ISOLATES
DISPLAY THREE ENTOMOPATHOGENIC MECHANISMS



1] PENETRATING CUTICLE.

2] ANTIBIOSIS.

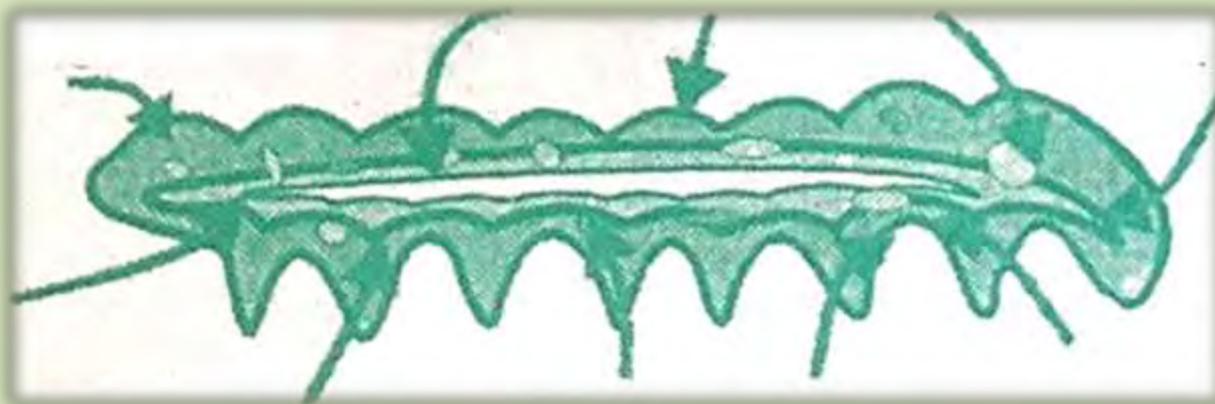
3] MYCOPARASITISM.



Diagrammatic Representation of BASECO affecting Insects

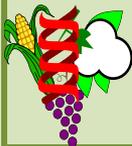
Weakens Circulatory, Immune
& Nervous System

Ruptures Cuticle/ Skin



Diseased Insect Dies

Infects Body Cavity



CUTICLE PENETRATION :

Bas-Eco once in contact with the insect, releases spores that germinate, penetrate through the cuticle and infect the insect pest.

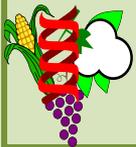
ANTIBIOSIS :

Occurs when the production of toxic metabolites or antibiotics by one organism has a direct effect on another organism.

The Active Toxins of *Beauveria brongniartii* are **3-methyl-benzoic acid methyl ester** and **4-methyl-benzoic acid methyl ester**.

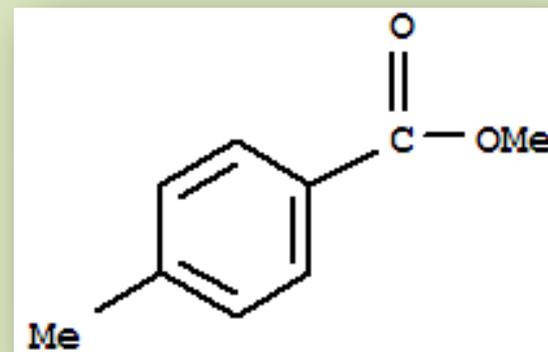
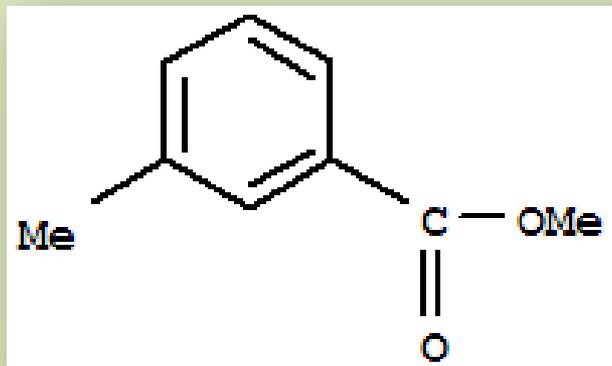
Beauveria brongniartii also, produces secondary metabolites like **Beauvericin, Bassianin, Tennellin and Oosporein**.

These Active Toxins and Secondary Metabolites inhibit the metabolic enzymes within insects, cause paralysis & ultimate death of insects.

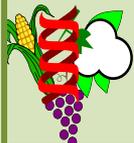


Active Toxins of *Beauveria brongniartii*

3-methyl-benzoic acid methyl ester (**C₉ H₁₀ O₂**)

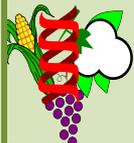
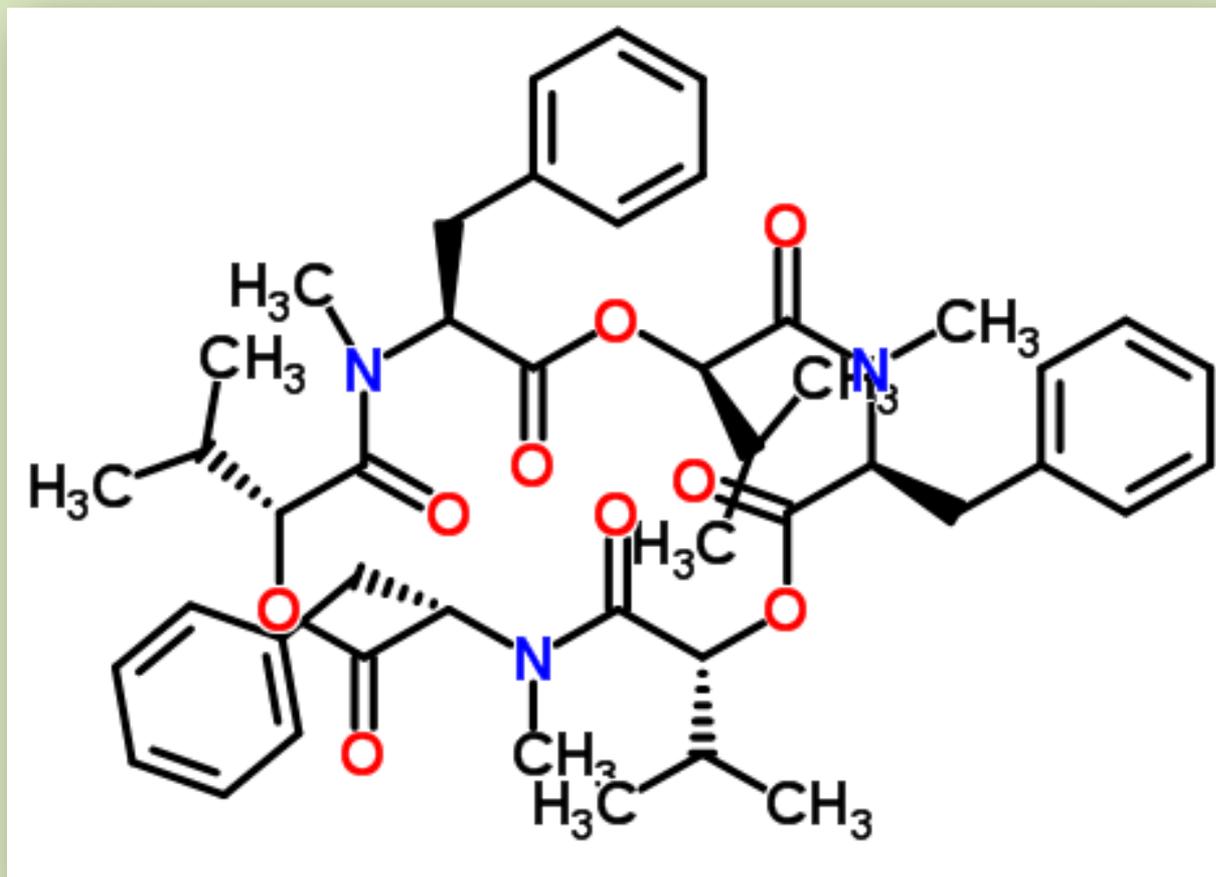


4-methyl-benzoic acid methyl ester (**C₉ H₁₀ O₂**)



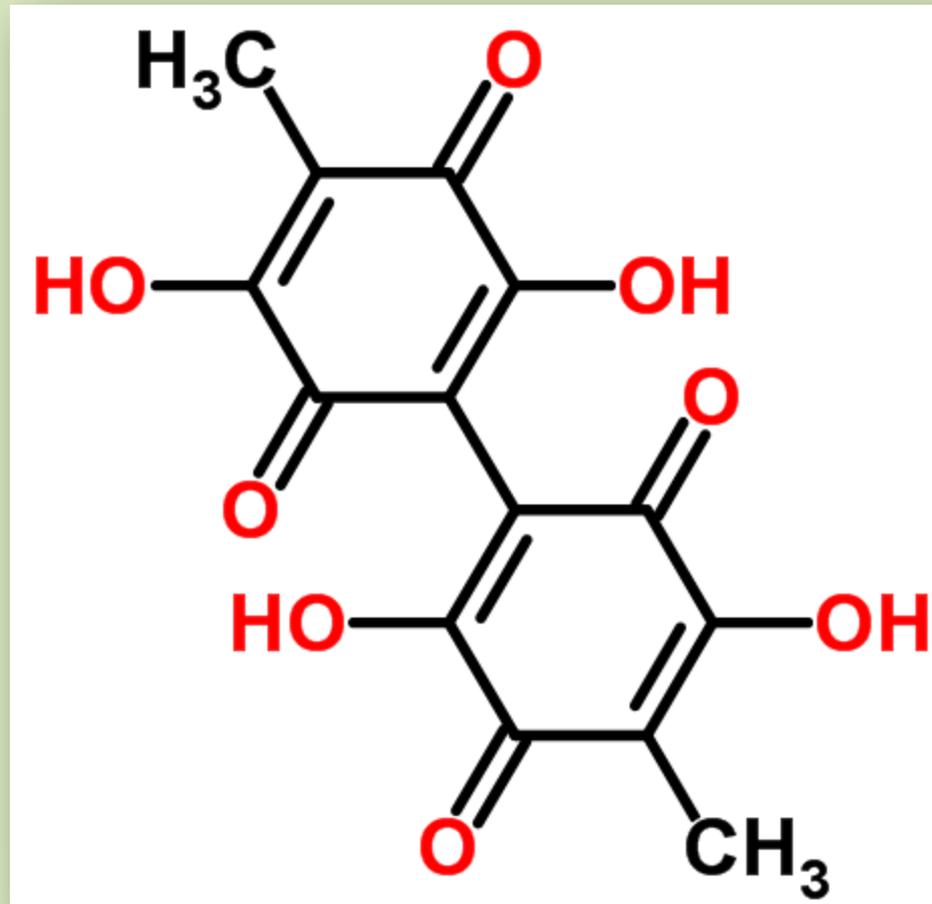
CHEMICAL STRUCTURE OF BEAUVERICIN

Beauvericin (**C₄₅ H₅₇ N₃ O₉**) is a cyclohexadepsipeptide, consisting of three N-methyl phenylalanine molecules alternated with three hydroxyisovalerate acid molecules .



CHEMICAL STRUCTURE OF OOSPOREIN

Oosporein (**C₁₄ H₁₀ O₈**) a dihydroxybenzochinon, - symmetrical red coloured 2,5-dihydroxybenzoquinone, derivative biosynthesized by a broad variety of soil borne fungi.

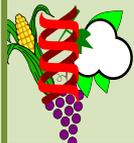
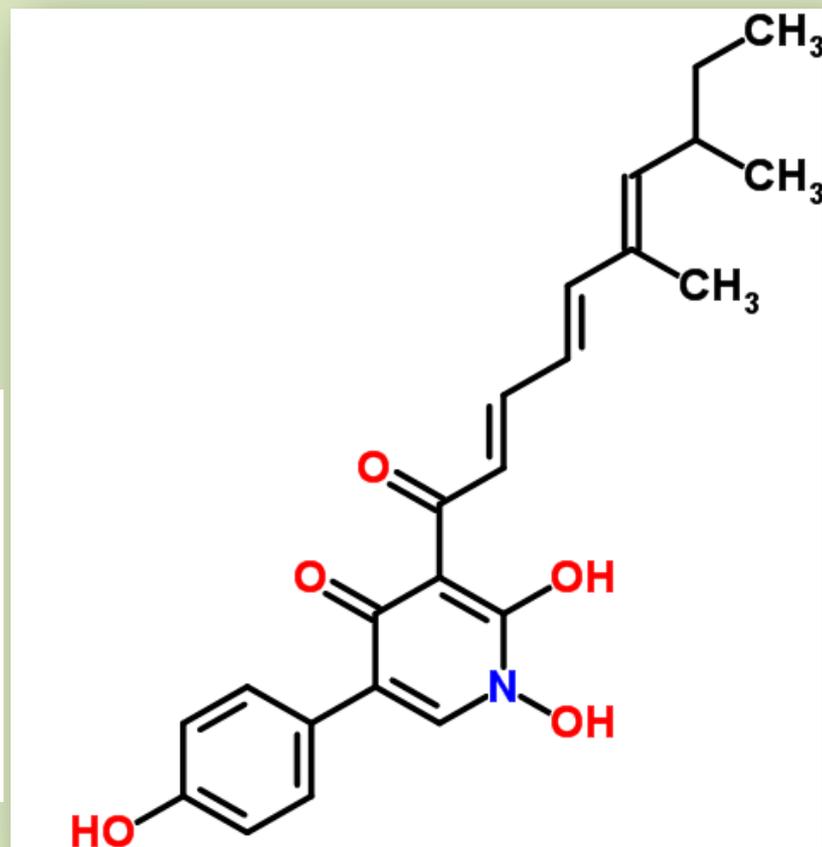
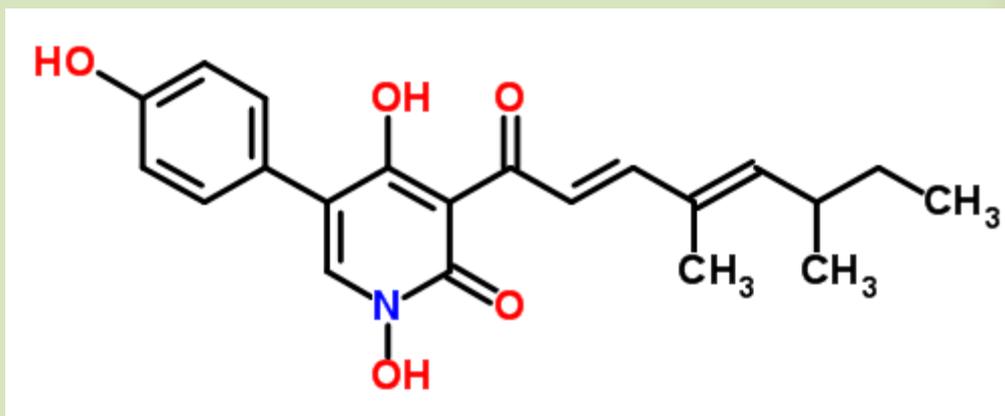


Similarities in Structures of Bassianin and Tenellin

Chemical Structure of Bassianin –
(C₂₃ H₂₅ N O₅) : 3-acyl derivatives of 1,4-dihydroxy-5-*p*-hydroxyphenyl-2(1*H*)-pyridone

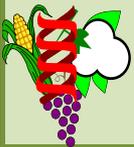
Chemical Structure of Tenellin

(C₂₁ H₂₃ N O₅) : 3-acyl derivatives of 1,4-dihydroxy-5-*p*-hydroxyphenyl-2(1*H*)-pyridone



MYCOPARISITISM

- Beauveria isolates multiply in the Haemocoel (Body cavity) of the Host Insect Pest.
- The Circulatory, Nervous and Immune Systems of the Host Insect Pest are Infected and Disabled, leading to the Death of the Insect Pest.



Entomopathogenic Fungus- BASECO- Contact Bio-Insecticide



Spodoptera



Mealybugs



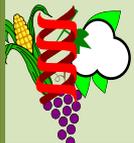
Helicoverpa



Spotted Bollworm



Spotted Bollworm



Method of Application of BASECO

- ▶ FOLIAR SPRAY : Mix 5ml/gm BASECO in 1 Lit. water and spray.
- ▶ SOIL DRENCHING : Mix 5ml/gm BASECO 1 Lit. water and drench the soil

INSECT PESTS CONTROLLED BY BASECO

MEALYBUGS

BEETLES

MITES

THRIPS

WHITEFLY

SPODOPTERA

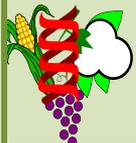
BORERS

ROOT GRUBS

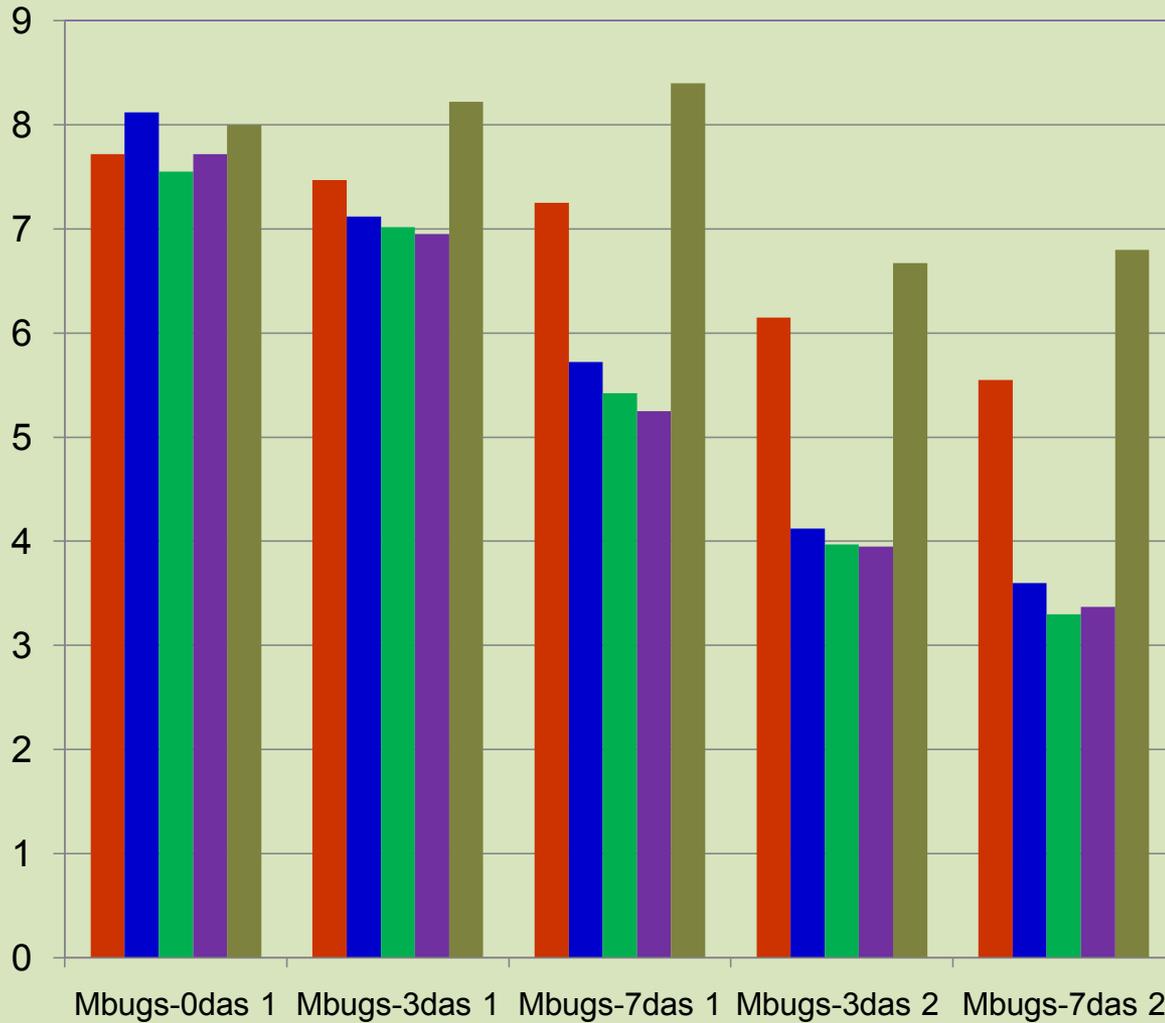
APHIDS

BOLLWORMS

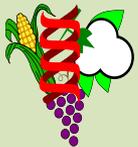
WEEVILS



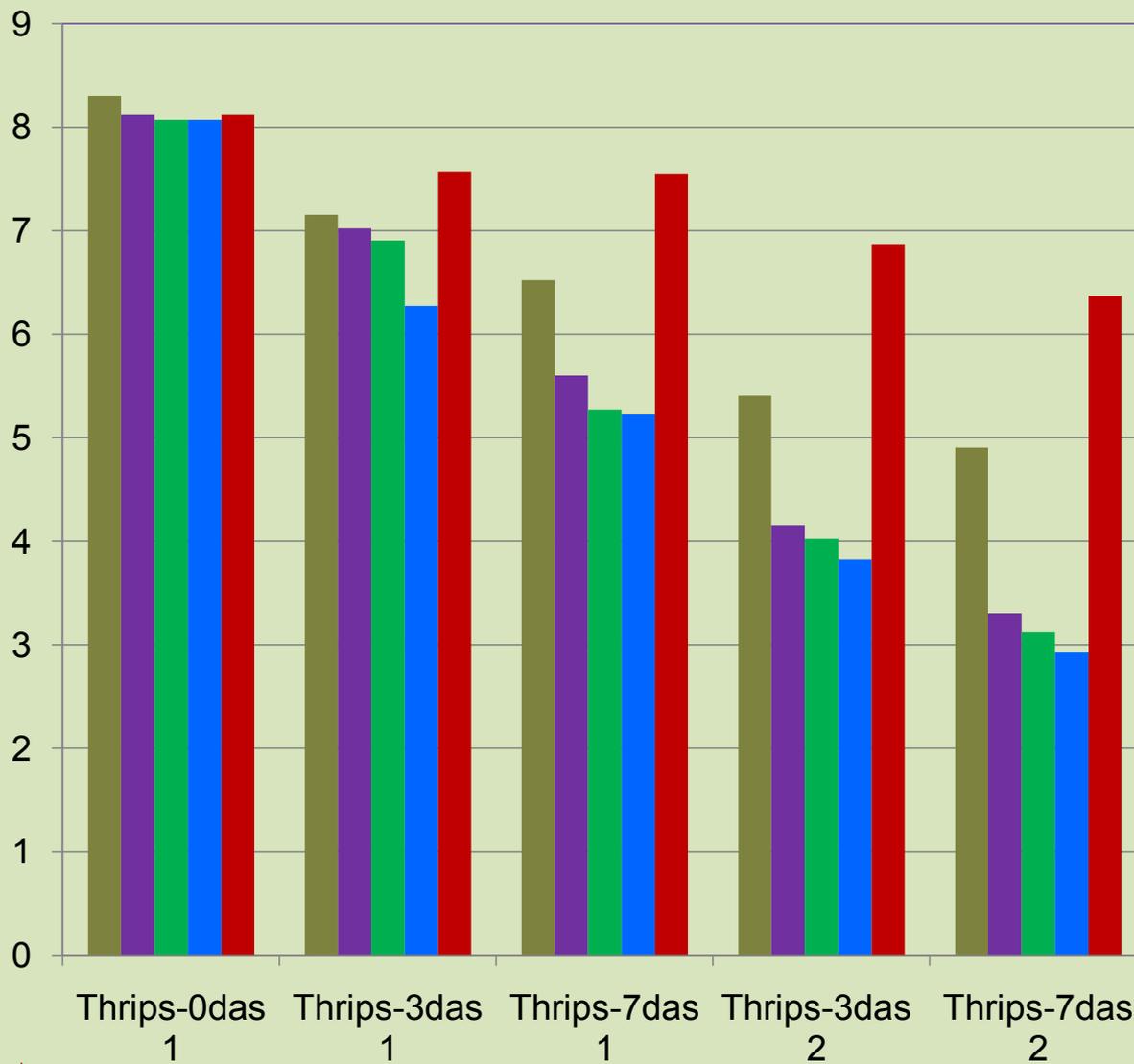
Control of Mealy Bugs with BASECO



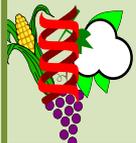
- BASECO 3ml/Lit. Water
- BASECO 5ml/Lit. Water
- BASECO 7ml/Lit. Water
- Dichlorovos 2ml/Lit. Water
- Un-Treated



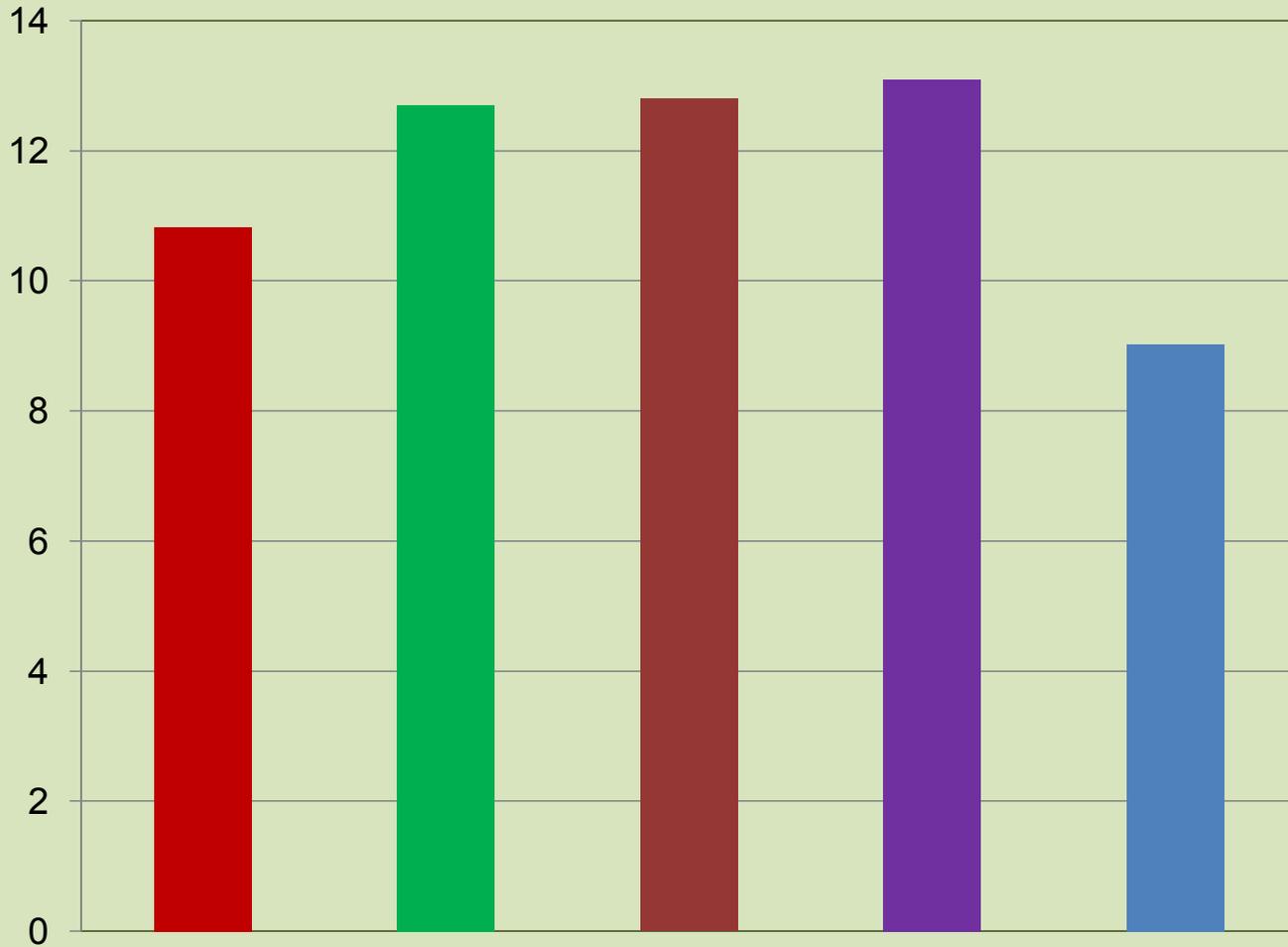
Control of Thrips on GrapeVines by BASECO



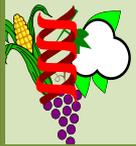
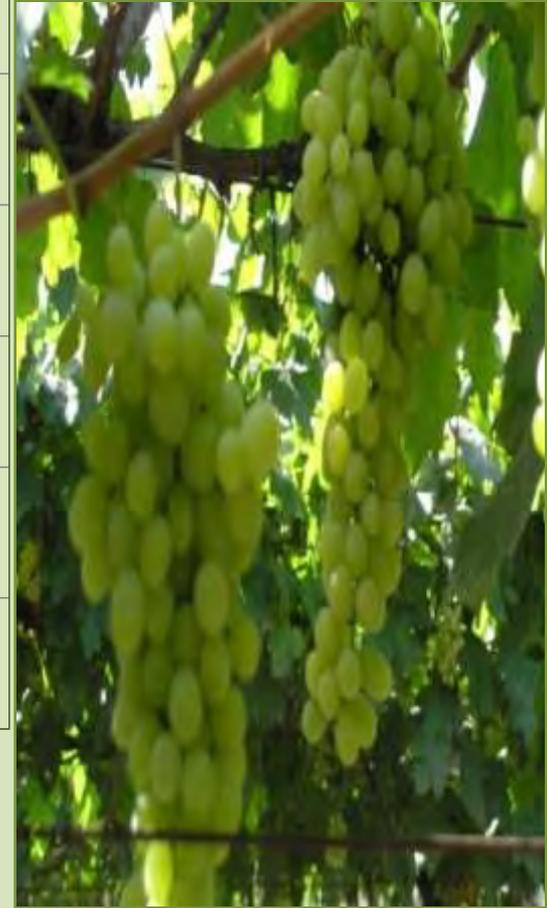
- BASECO 3ml/Lit. Water
- BASECO 5ml/Lit. Water
- BASECO 7ml/Lit. Water
- Dichlorovos 2ml/Lit. Water
- Un-Treated



BASECO on Grape – Increase in Yield (Kg/Vine)



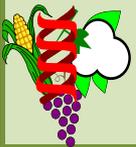
- BASECO 3ml/Lit. Water
- BASECO 5ml/Lit. Water
- BASECO 7ml/Lit. Water
- Dichlorovos 2ml/Lit. Water
- Un-Treated



TRIAL RESULTS ON CHICKPEA

CONTROL OF *Helicoverpa armigera* BY BASECO

Foliar Application	Percent Pod Damage		Grain Yield Qunital/ Ha	
	Yr. 1	Yr. 2	Yr. 1	Yr. 2
Beauveria B.	7.3	6.3	25.1	22.5
Control.	18.1	14.5	20.1	16.7



BENEFITS / ADVANTAGES OVER CHEMICAL INSECTICIDES

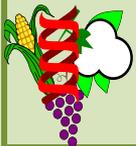
ECONOMICAL

- CONTROLS EGG, LARVA & ADULT INSECTS
- CHEMICAL INSECTICIDES ARE EXPENSIVE



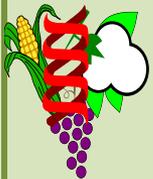
ENVIRONMENTALLY SAFE

- NO RESISTANCE DEVELOPS
- TARGET SPECIFIC
- SAFE HANDLING
- NO RESIDUES LEFT IN FOOD



BIO-CONTROLS - AN EMERGING OPPORTUNITY

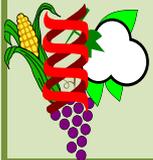
- Minor pests are becoming major in many crops e.g. Mites, Mealybugs, Jassids, Thrips, etc.
- Soil Nematodes problem is increasing.
- Yields are Stagnating.
- Soil Health is Degrading.
- Organic Food business is USD 40 Billion & growing !
- Bio-Controls in Crop Protection- Geometric Increase.
- Bio-Controls compatible with Safe Synthetics offer Tremendous Opportunity.



Bio-Pesticides Global Market Scenario

- Agro-Chemicals market about USD 35 -37 Billion.
- BioPesticides Market about 2% - USD 750 Million('09).
- Bt alone USD 375-450 Million (Growth Stagnant).
- Neem based Products – USD 20-30 Million.
- All other Bio-Pesticides – Microbials, Pheromones, Plant Extracts, etc., about USD 300-350 Million.

- Bio-Pesticides Market will double by 2015.
- WHY ? BASF, BAYER, DUPONT, SYNGENTA, DOW, FMC, are now in the Bio-Pesticides Space.



Thank You



KETAN MEHTA

ECOSENSE LABS. (INDIA) PVT. LTD.

Email: info@eecosense.com

