

### 20 VALAGRO FOR FUTURE FARMING



# The benefits of Biologicals for Indian agriculture

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# GLOBAL MARKET SIZE OF BIOPESTICIDES

- A growing awareness of biopesticides' favourable features, including safety and efficiency, as well as stringent legislative requirements, are driving the biopesticides market.
- The biopesticides market grew 24% from 2014 to 2016 globally to over \$1.8 billion
- The biopesticides market is projected to reach USD 6.60 Billion by 2022, from USD 3.22 Billion in 2017, at a CAGR of 15.43% during the forecast period
- Currently, the United States, China, and Italy are the largest markets, accounting for almost 80% of the total global sales
- The top three fungi—Trichoderma sp., *Beauveria bassiana*, and *Paecilomyces lilacinus—account* for about 7% of global biopesticide sales.

# INDIAN MARKET SIZE OF BIOPESTICIDES

- India is anticipated to witness highest growth in the forecast period due to increasing awareness among farmers for the benefits of Biofertilizers.
- The India biopesticides market generated revenue of \$102 Million in 2016 and is anticipated to contribute \$778 Million by 2025, growing at 25.4%.
- Asia-Pacific Biofertilizers Market was worth \$0.40 billion in 2018 and estimated to be growing at 14.4%, to reach \$0.78 billion by 2023.

### **Soil Microbiome Manipulation**



Time or space

**Trends in Plant Science** 

#### Impact of Soil Microbiomes on Above ground Herbivores

1. Ento-mopathogenic fungi *Beauveria bassiana* and *Metarhizium anisopliae*Promote plant growth and insect resistance
Translocate nitrogen from aboveground insect cadavers to the plant via fungal mycelia

- Jaber et al., 2016; Behie et al., 2012

2. Endophytes Trichoderma

Colonize leaves as endophytes – Suppress thrips

-Muvea et al., 2014



# BIOLOGICALS

PSEUDOMONAS FLUORESCENS TRICHODERMA VIRIDE TRICHODERMA HARZIANUM **PAECILOMYCES LILACINUS** VFRTICILLIUM CHLAMYDOSPORIUM BACILLUS SUBTILIS BEAUVERIA BASSIANA MFTARHIZIUM ANISOPI IAF



# Nematode wilt complex in guava nurseries – biologicals play a great role in the sustainable management



Roots showing nematode and fungal wilt complex - biologicals play a great role in the sustainable management

Nematodes predisposes *fungal pathogens to cause disease complex*.

Meloidogyne + Fusarium spp. Disease





# SUCCESS STORY OF NURSERY FARMER MR SURENDAR



Nematodes and fungal wilt in pomegranate. It is very serious. The problem is seen in most of the pomegranate growing areas in India. biologicals play a great role in the sustainable management



#### Sustainable production of pomegranate using biologicals.



# Sustainable production using biologicals





#### Seedlings obtained from certain nurseries were found to be infested with pathogenic nematodes, fungi or bacteria









#### SUSTAINABLE PRODUCTION OF CAULIFLOWER USING BIOLOGICALS



Nematodes and fungal wilt in Okra. The problem is seen in most of the okra rowing areas in India. biologicals play a great role in the sustainable management



Nematodes and fungal wilt in Tomato. The problem is seen in most of the tomato rowing areas in India. Biologicals play a great role in the sustainable management





#### SUSTAINABLE PRODUCTION OF TOMATO USING BIOLOGICALS



#### Management of Nematode in cucumber using biologicals



Nematode problems and bacterial soft rot in Carrots . The problem is seen in most of the carrot growing areas in India. Biologicals play a great role in the sustainable management



Nematode and bacterial disease complex is rampant in Cpasicum. The problem is seen in most of the capsicum growing areas in India. Biologicals play a great role in the sustainable management





• Ralstonia

# **Disease complex in Capsicum**



• *M. incognita* 

#### SUSTAINABLE PRODUCTION OF CAPSICUM USING BIOLOGICALS





Healthy plant







#### Sustainable production of chillies



#### Sustainable management of Capsicum poly house





## Sustainable crop production

#### SUSTAINABLE PRODUCTION OF POTATO USING BIOLOGICALS



Nematode and fungal disease complex in Gerbera. The problem is seen in most of the Gerbera growing areas in India. Biologicals play a great role in sustainable management



## Sustainable production of Gerbera using biologicals



# Sustainable production of Carnations using biologicals











#### SUSTAINABLE PRODUCTION OF TUBEROSE USING BIOLOGICALS



#### SUSTAINABLE PRODUCTION OF COFEE SEEDLINGS USING BIOLOGICALS







#### SUSTAINABLE PRODUCTION OF PADDY USING BIOLOGICALS





#### A "Biopesticides Awareness & Training programme" was held at Agricultural Research Station & Krishi Vigyan Kendra, Virinjipuram, Vellore district, Tamil Nadu on 25<sup>th</sup> Jan 2016.



# THANK YOU FOR YOUR ATTENTION