



4th Generation Hybrid Fertilizer Technology

Agriculture Scenario in India

<p style="text-align: center;">STRENGTHS</p> <p>Total crop area – 194.40 million hectares A wide variety of crops is supported by the various agro climatic zones in India Majority of population involved in agriculture Prosperity in agriculture can lead to prosperity of India as per capita income of larger mass would increase</p>	<p style="text-align: center;">WEAKNESSES</p> <p>Illiteracy and poverty amongst farmers prevents them from catering markets Logistics lacking preventing produce network Lack of equipment and tools Lack of irrigation facilities and adoption of new technologies Smaller farms resulting in less revenue</p>
<p style="text-align: center;">OPPORTUNITIES</p> <p>New Insurance Scheme has a more business type approach with lower premiums <u>The very fertilizers which are widely used by farmers all around India can be used as carriers of MICROBES to REJUVENATE the SOIL CONDITIONS</u> Irrigation projects being accelerated. Better produce marketing networks</p>	<p style="text-align: center;">THREATS</p> <p>Unpredictable weather conditions due to climate change causing difficulty in coping <u>SOIL CONDITIONS deteriorating and causing a decrease in productivity</u> The need and use of pesticides resulting into respiratory and related health hazards Agriculture not viewed fully as a business</p>

Proposed Technology: 4th Generation Hybrid Fertilizer Technology

The integration of a set of microbes that can provide all essential services blended with commonly used chemical fertilizers – thereby providing significant implications for optimizing agricultural conditions.

- Allows the flow of the chosen set of microbes to a larger area of land with lesser effort, cost and free of any additional burden to the farmer.
- The activity of soil health rejuvenation becomes a Public - Private effort in the larger interest of the population and food security.
- The soil will be able to better support abiotic conditions such as droughts, flooding, temperature extremities, soil pollution, etc.
- The natural ecosystem would flourish over time resulting in to a higher biological capacity of the soil to function as an effective sustainable living system.



A NOVEL APPROACH TO STIMULATE SOIL HEALTH Thru CONSORTIA BASED BIODIVERSIFIED APPLICATION USING CHEMICAL FERTILIZERS AS CARRIERS

Sr No	BENEFICIARY	BENEFIT	Details	NET IMPACT
1	FARMER	Zero Burden in terms of choice, application & cost	Soil Eco Restoration is not only the farmer's duty but a group responsibility. This method allows farmer to be relieved of the cost and burden of understanding and applying this technology	Increased tolerance of crop to biotic & abiotic stresses. Soil health will support higher yields over time, increased tolerance to pests / insects and better quality of produce.
2	GOVERNMENT	25% Reduction in UREA (IMPORTS)	Out of total 400 LMT UREA demand in India, roughly 25% (100 LMT) is imported. This strategy would allow 25% reduction in UREA replaced by BIOTECHNOLOGY. Imported Quantity can be mitigated	The EX CHEQUER (GOVT) would benefit to the tune of 1000s of CRORES for the purchase of UREA
3	SOIL HEALTH	Physical, Chemical & Biological Properties of Soil are Corrected	Soil Microbiology being improved would result into more fertile land for agriculture. Less diesel would be consumed or less strain on farm animals for ploughing the land.	LESS AIR POLLUTION LOWER WATER CONSUMPTION BETTER CROP QUALITY
4	GENERAL PUBLIC	Reduced use of Pesticides. UREA is responsible for many of the pest / insect attacks in agriculture	The natural reduction in pest / insect resistance due to restoration of natural ecological conditions of both soil and local environment.	CARCINOGENIC content of air is reduced. Probability of CANCER, RESPIRATORY disease will be checked. The health benefit; if estimated may be of value which may not be expressed.

Time is of Essence



The Cabinet Committee on Economic Affairs had approved the continuity of Subsidy on Urea up to 2019-20.



An increase in price to reduce subsidies and encourage lesser use of Urea may not be viewed favourably by the farming community.



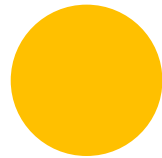
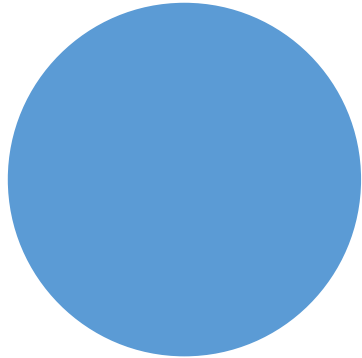
However, reduced use of Urea is essential, and an innovative strategy is necessary to sustain prices while promoting reduced use of Urea.



One such farmer friendly policy would be the introduction of an alternative Soil Friendly Microbially Enhanced chemical fertilizers.



This strategy would allow maintaining current prices, reduce UREA use, enhance soil health and also yield a net savings on Subsidy after allowing for the cost of the value added microbes.



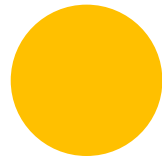
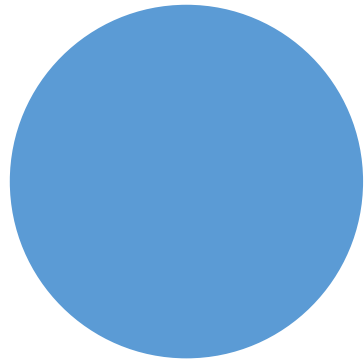
NOVEL
U.S. PATENTED
(No: 6,311,426, 6,228,806)

NUTRIENT REDUCTION TECHNOLOGY

(Presented to NITI AAYOG on APR 05th, 2016)

- To Improve Soil Health And
- Agriculture Productivity

(FCO - NOC Obtained from Directorate of Agriculture, GUJARAT STATE)



IFFCO
Invitation for Presentation
Dated 06th April, 2016

- **Conclusion of Presentation & Discussion**

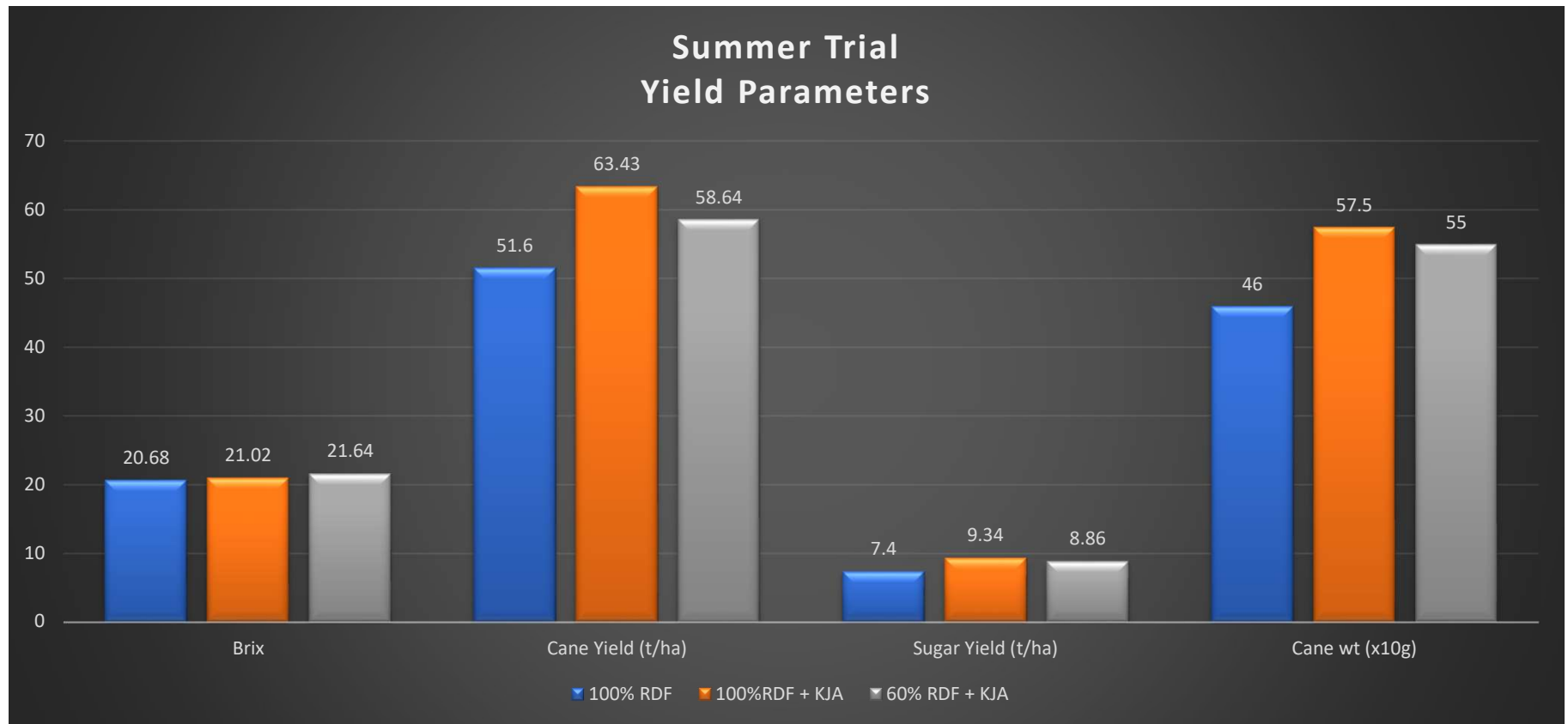
- The presentation was well received as a strategy for Fertilizer Reduction and clear interest to participate in its implementation. However, policy changes and permissions would be necessary for deployment of this technology due to subsidy considerations

EFFICACY REPORTS

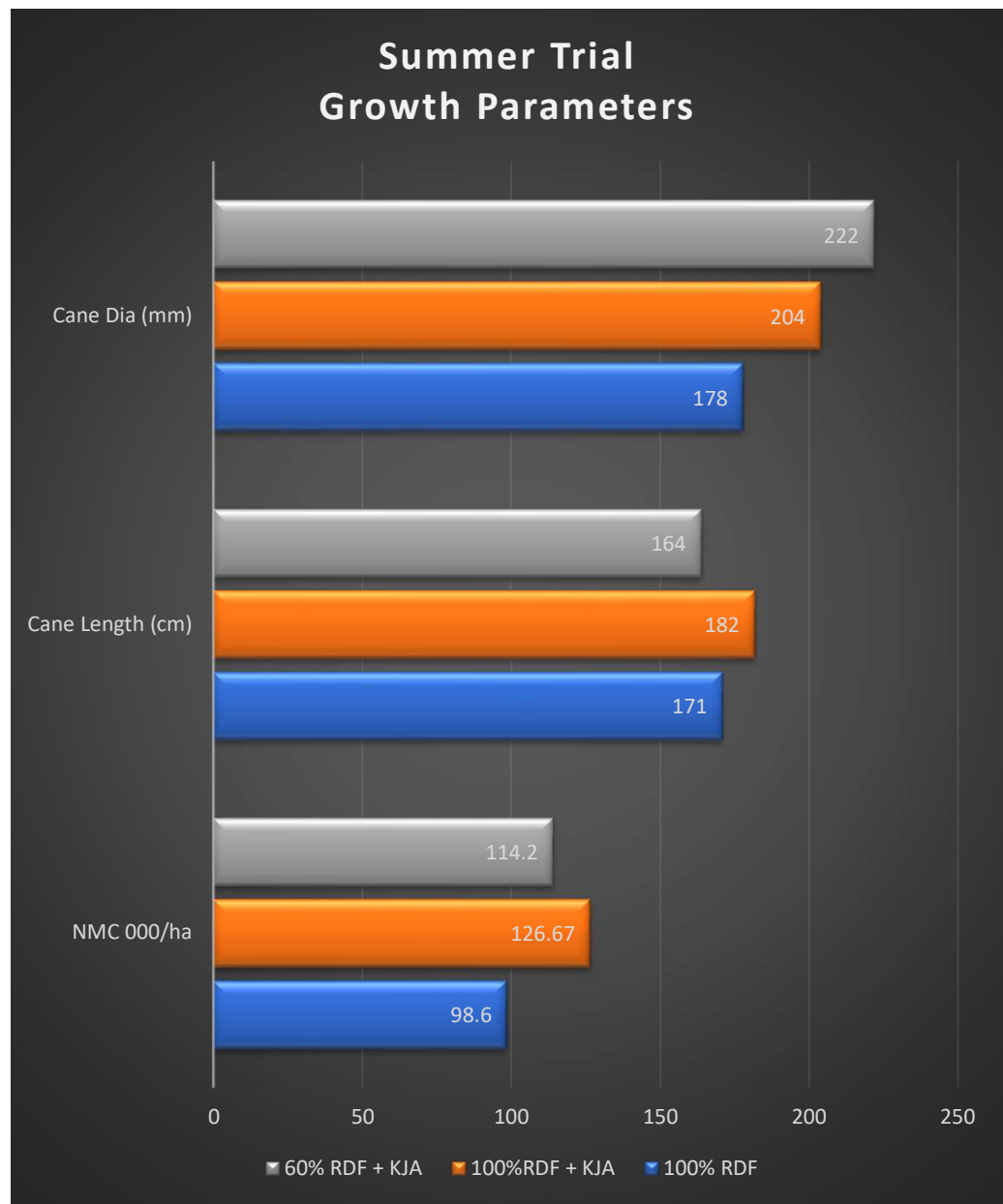
Salient Observations / Conclusions

- **Indian Institute of Sugarcane Research, Lucknow**
 - “Thus the present study reveals that **bio products have better supplement with inorganic fertilizers for improving nutrient use efficiency, cane production, and sustaining soil health** for longer period. The reduction in chemical fertilizers could be made possible with supplement of bio products in sugarcane crop in subtropical conditions. **The study reveals that these bio products could be mixed with chemical fertilizers without declining efficiency.**

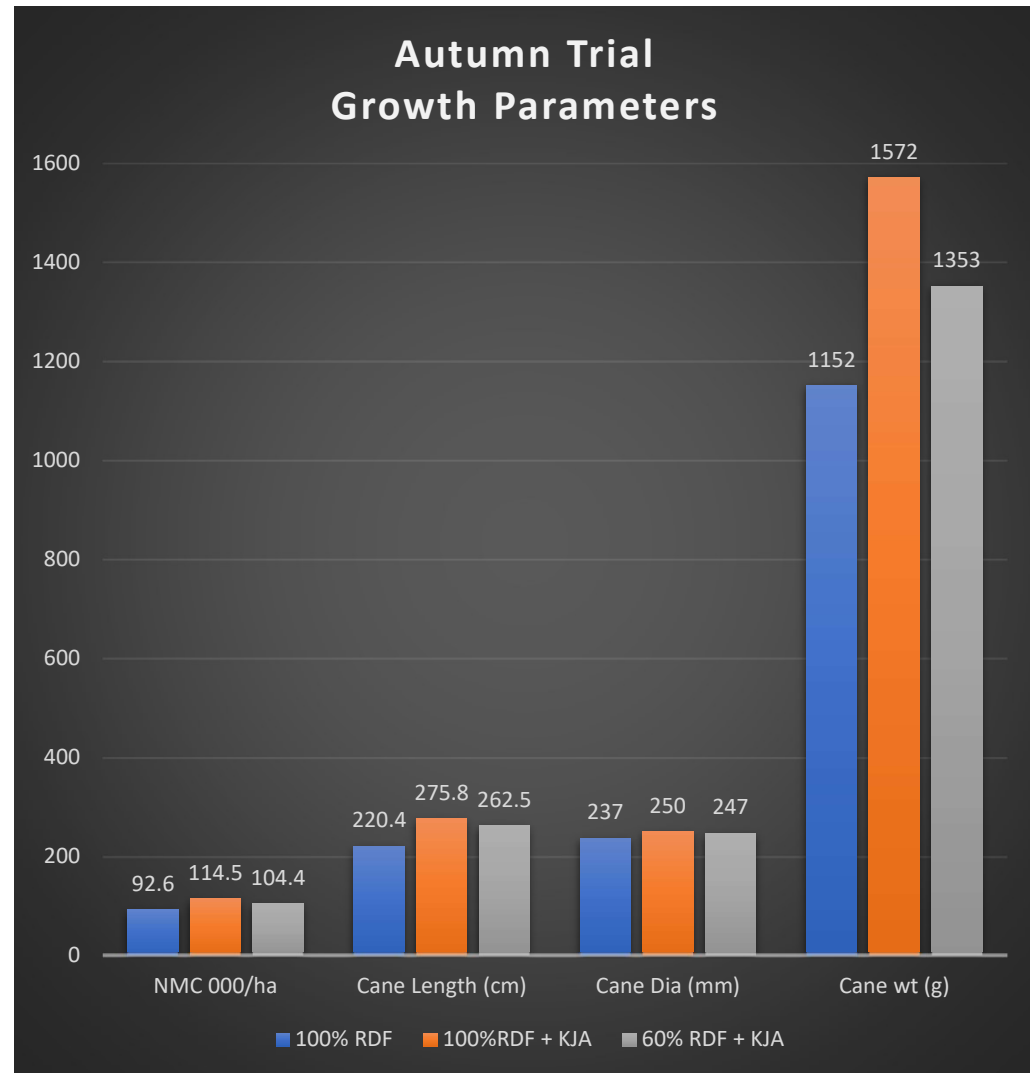
IISR – Yield Parameters



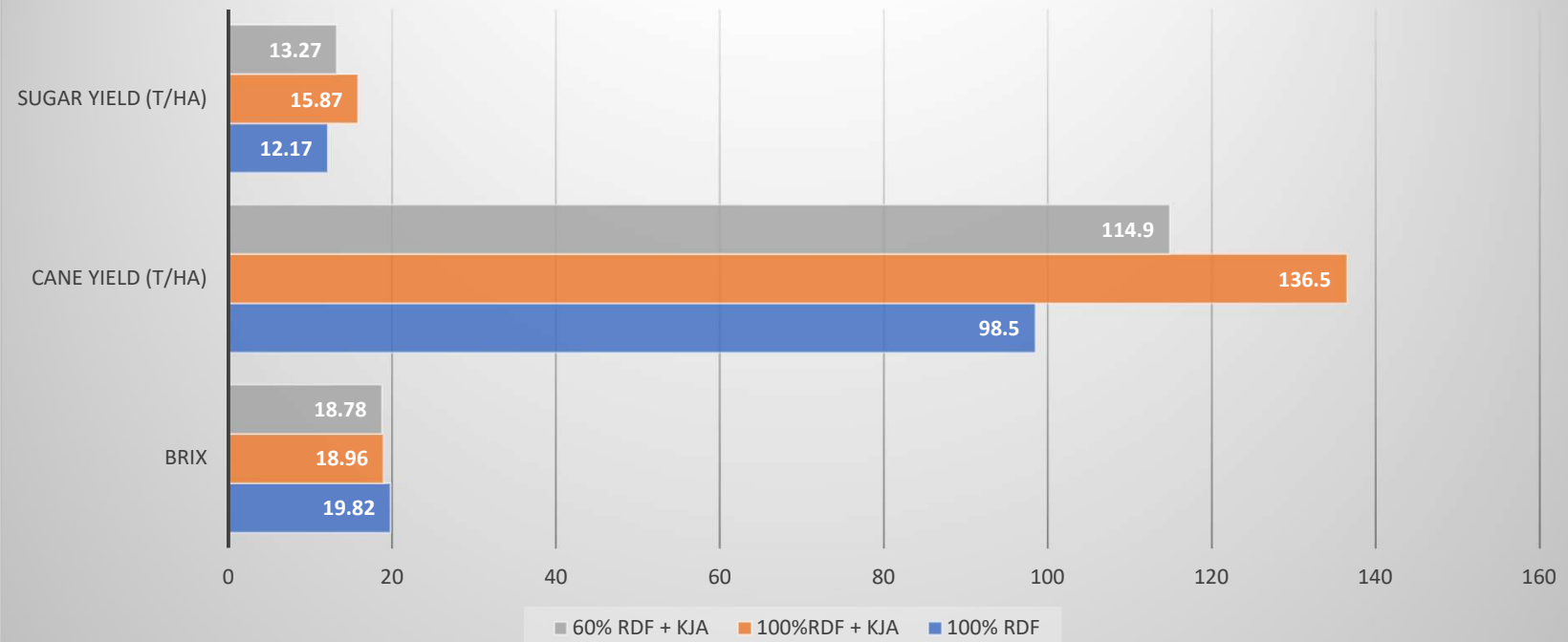
IISR – Growth Parameters



IISR – Growth Parameters (Autumn Season)



Autumn Trial Yield Parameters



IISR – Yield Parameters

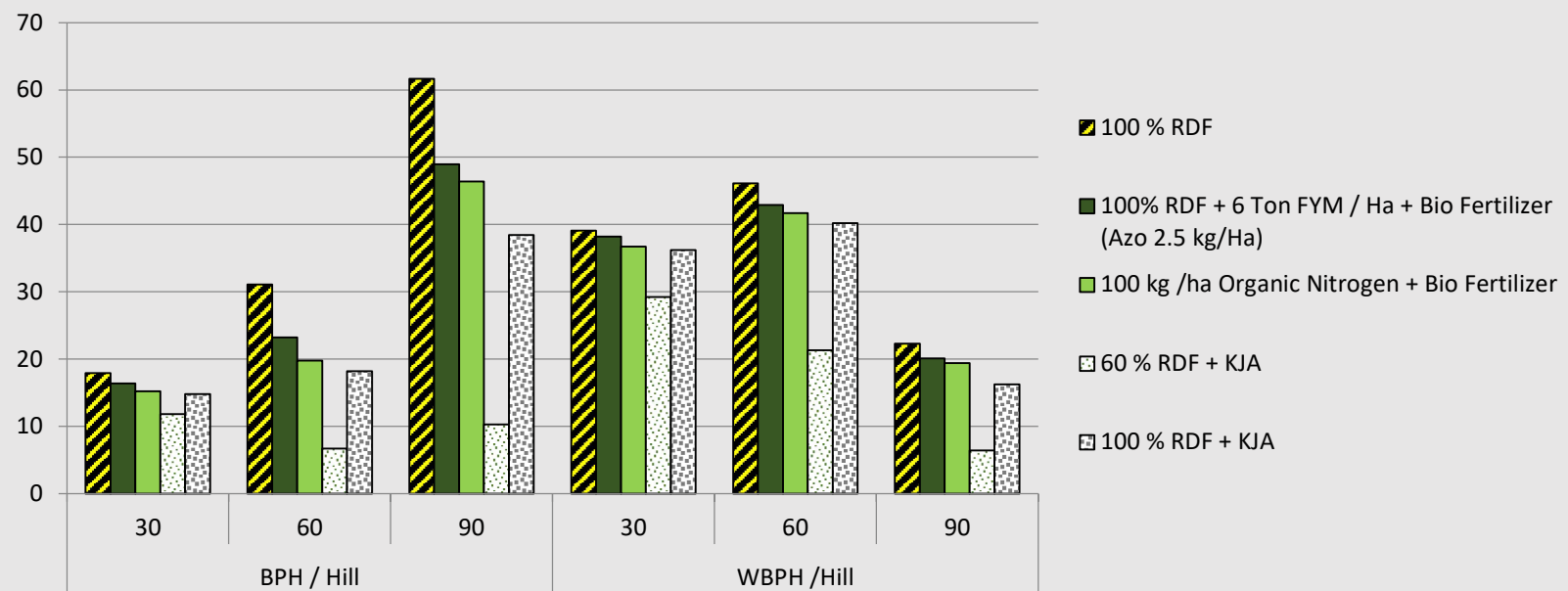
EFFICACY REPORTS

Salient Observations / Conclusions

- **University of Agricultural Sciences, Raichur**
 - “It was evident from the entomological studies that T8 (80% RDF + bioproducts C) i.e. Diamond (500 g/acre) + Bio-mix (30 Kg/acre) and T6 treatments (60% RDF +bioproducts B i.e., : Dharamrut (60 Kg) + Diamond (250 g/acre) + Platinum (1500 g/acre) proved superior by registering **lowest population of leafhopper and aphids.**”



Raichur University: Abiotic Stress Control Paddy



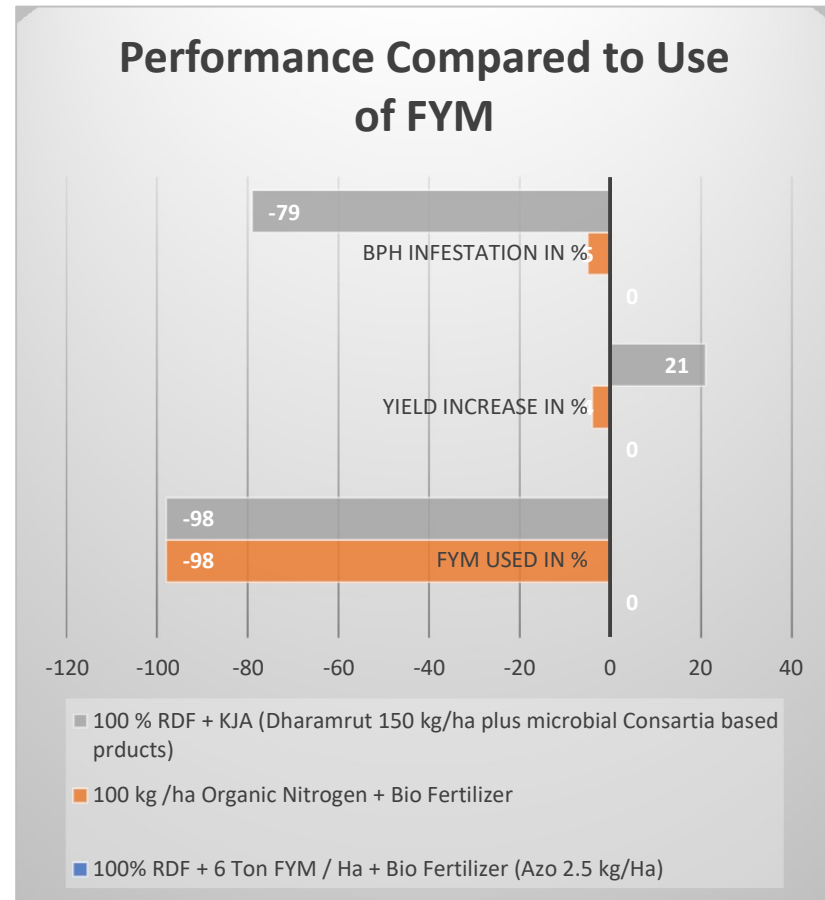
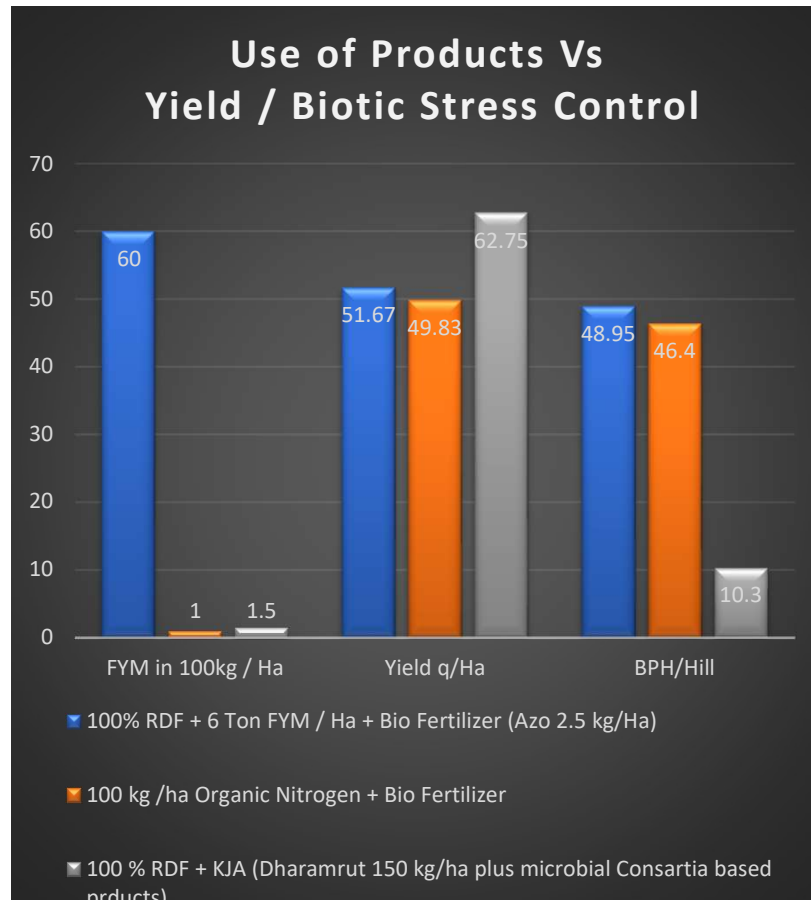
EFFICACY REPORTS

Salient Observations / Conclusions

- **University of Agriculture Sciences, Raichur**
 - “Application of **bioproducts along with fertilizers** recorded better growth and yield parameters like significantly higher plant height, a greater number of tillers per plant, panicles per hill, grains per panicle and resulted in significantly higher grain yield of paddy over application of RDF or RDF + FYM + Bio fertilizer or 100 % N using organics + Bio-fertilizers.”



Raichur University : Product Qty Vs. Yield & Biotic Stress Control



EFFICACY REPORTS

Salient Observations / Conclusions



Navsari Agriculture University, Navsari, GUJ

“Soil Nutrients, viz, N and K₂O were significantly influenced due to different KJA (Krishi Jivan Amrut) sugarcane kit treatments”

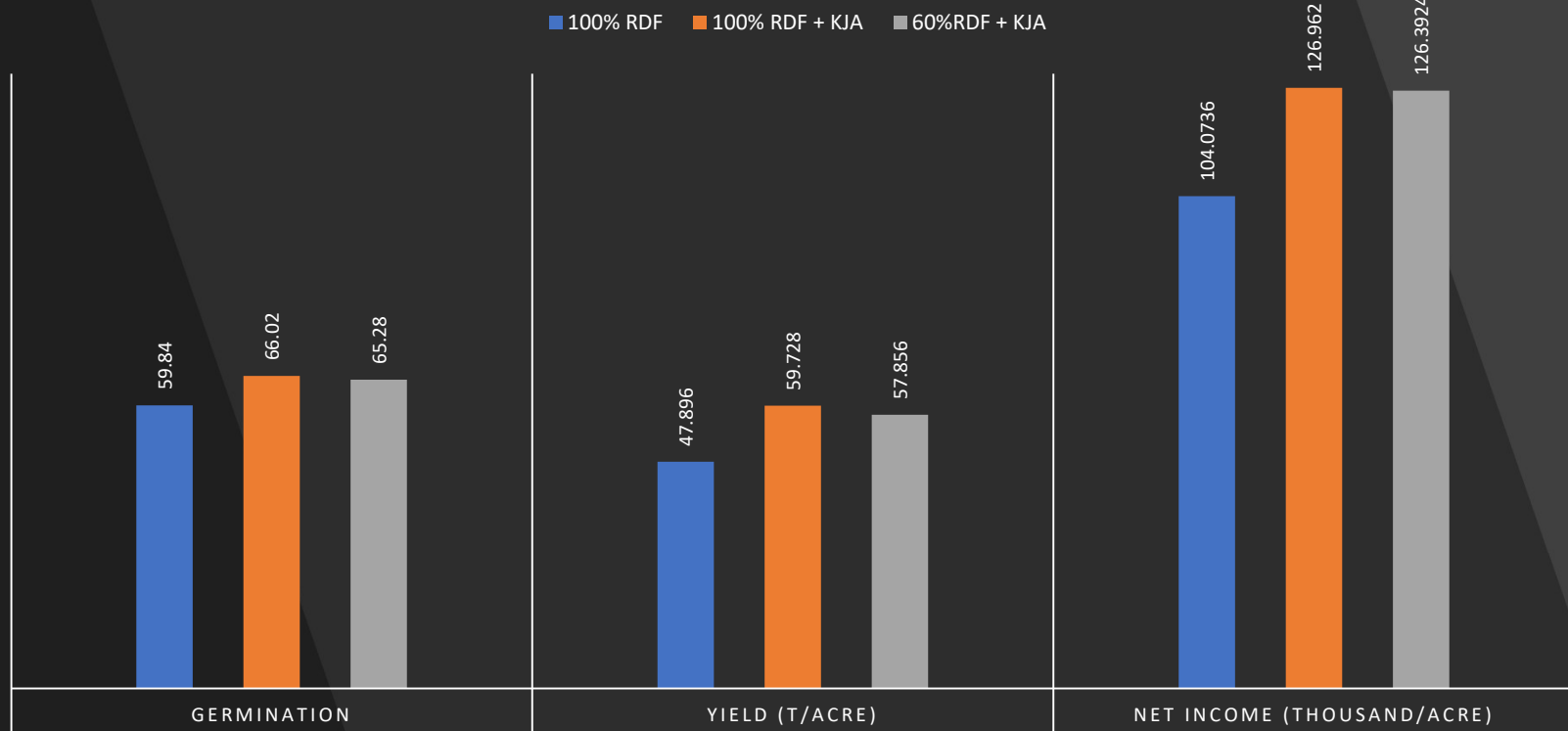


Delamere Trials, Kenya

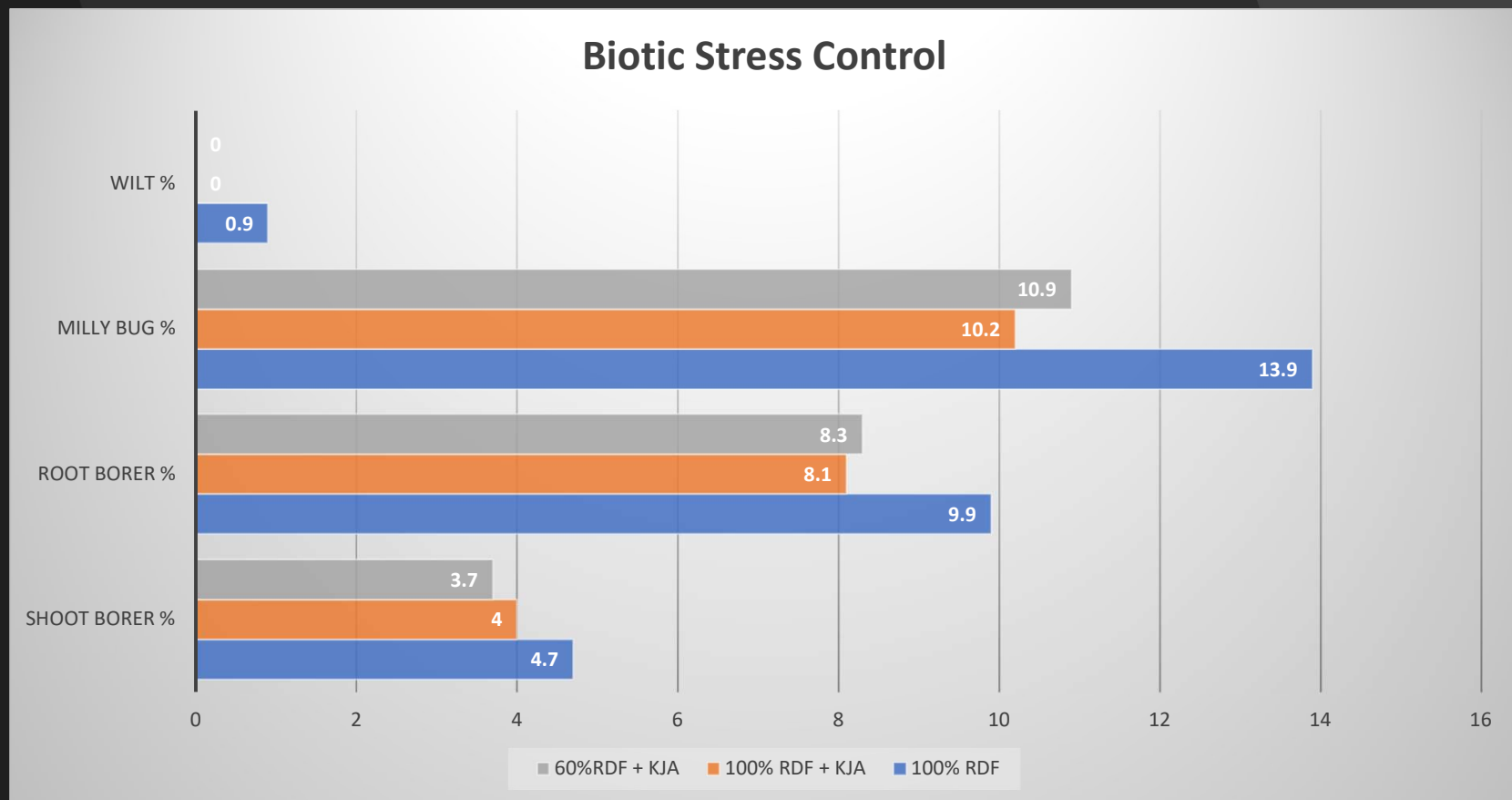
“Reduction in fertilizer in treated block **did NOT reduce the yield**; on the contrary it saved the fertilizer cost by 32310/= KSH per ha.

Navsari Agriculture University : Yield & Returns

YIELD & RETURNS



Navsari Agriculture University : Biotic Stress Control



Important Conclusions of University Trials

The mixing of the microbes with the chemical fertilizer did not decline the efficiency of the microbes.

The yields in all test plots were consistently higher despite the reduction in fertilizers by up to 40% of RDF.

Biotic Stresses such as pest attacks leading to diseases were also considerably lower than the control plots.

Fertilizer Only based revenue calculations show a clear gain for the farmer.

The test plots with reduced fertilizer applications performed better than the control plots using 100% N substitution organics (tons) or 6T manure / Ha or other conventional bio fertilizers.

Frequently Asked Questions

Why mix the microbes with chemical fertilizer?

- Chemical fertilizers such as UREA, DAP, SSP and MOP are widely used fertilizers. Hence, they could serve as ideal carriers of microbes to the soil that can ensure continuity, consistency and without increase in price and ease of application. It is a classic case of converting a THREAT to an OPPORTUNITY by the conversion to Soil Friendly Fertilizers.

Will the microbes survive in the mixture with chemical fertilizers?

- A patented 3 layer encapsulation technology not only allows protection to the microbes from the chemical exposure, but also ensures its survival and initial growth due to the provision of key growth nutrients.

What is the comparison of Neem Coated UREA and the Microbe Mixed Fertilizer?

- Neem coated, along with preventing UREA theft, has helped yields and soil conditions. However, Neem Coated Urea comes at a moderate cost and cannot help the plant system to the extent a community of microbes can in terms of bettering soil biological activities and enhanced plant performance.

Subsidy Calculations



OPTION I:

Allow a 1% mixing of Biological Consortia with commonly used fertilizers, viz, UREA & DAP.

Savings Expected: None – Will result in higher cost of Microbes.



OPTION II:

Allow a 1% mixing of Biological Consortia with commonly used fertilizers & reduce fertilizer by 30%. Convert bag size to 35 kg from 50 kg size.

Savings Expected: Up to 20%



OPTION III:

Allow 15 kg replacement of Fertilizer with Biological Consortia and leave as 50 kg bag.

Savings Expected: Up to 10%



Farmer Field Plots

Horticultural Crops: Banana,
Papaya, Mango, Chiku, and others

Vegetable Crops:
Tomato, potato, peas, eggplants,
okra, bitter gourd, Squash,
zucchini, bell pepper, chillie, etc

Pulses, Plantation crops, fruits,
etc.

Gujarat, Karnataka, Maharashtra, Madhya
Pradesh, Uttar Pradesh, Kerala, Andhra Pradesh

Field Results – Papaya Crop

- **OBSERVATIONS:**

- Plot better sustained high temperatures
- Canopy was well built protecting fruit
- Consistency in the quality & yield/plant
- Lower Cost & Higher Yield
- Rs. 44,000 per acre versus Rs. 78,000





Field Results – Papaya Crop

- Well managed during Abiotic Stresses such as flooding conditions.
- Healthy eco system within the plants (feeling of fresh oxygen, no insects and no other disturbances).
- Visited by over 1000 farmers and scientists including well know Nematology Expert, Dr. B. A. Patel from Anand Agriculture University.



Field Results - Tomatoes

- **Observations:**
- Zero Pesticides
- Zero Fertilizers
- 50% Lower Cost
- Less Leaf Curling
- Better Shelf Life



Field Results – Bitter Gourd

- No Chemicals
- Dense Growth of leaves
- Much higher yield
- Superior Quality of Crops
- Better Shelf Life



Grapes – Chemical Free



- **OBSERVATIONS:**
- No Chemical Nutrients
- Zero Pesticides
- **Yield levels :** (Average yield levels in Chemical farming in the locality : 10-12 tons/acre)
 - Season 2016 – 6 tons/acre;
 - Season 2017 – 8 tons/acre ;
 - Season 2018 – 10 tons/acre.
- **On Farm Price received :**
 - Fresh Grapes – Rupees 75 per Kg against market rate of 15 Rupees.



Paddy in Saline Soil

- In Tungabhadra project area in North Karnataka comprising of four districts (Koppal, Bellary, Raichur and Yadgiri) out of 10 lakh acres , 2.5 Lakh acres has become totally saline. The pH is around 11 and E.C is more than 5.
- We have used the microbial consortium technology in 25 acres of land in 3 villages (Shankar sing camp, Emmiganur and Nelludi Kottala) of Bellary ditrict in coordination with KVK, Gangavati. The yield levels of 25-30 bags versus normal yields in normal soil of 40 to 50 bags per acre were achieved and farmers are really happy



Success Stories: Soil Improvement



Alkaline Soil
Neutralization

Success Stories: Soil Improvement



↓ Clay Rocky Soil
converting to soft soil



Increase in Earthworm
Population

Success Stories: Abiotic Stress Management

Control



Plant Structure
under water stress

Water and temperature
stress management,
same field same season
plot next to each other

Treated



Success Stories: Root Structure Variation



45 Day after
Transplantation –
15 days after
Platinum
application



Left Normal fully grown
Brinjal plant

Right and Middle Young plant
after 15 days of Platinum
application



Success Stories: Root Structure Variation

Control



Treated

Control



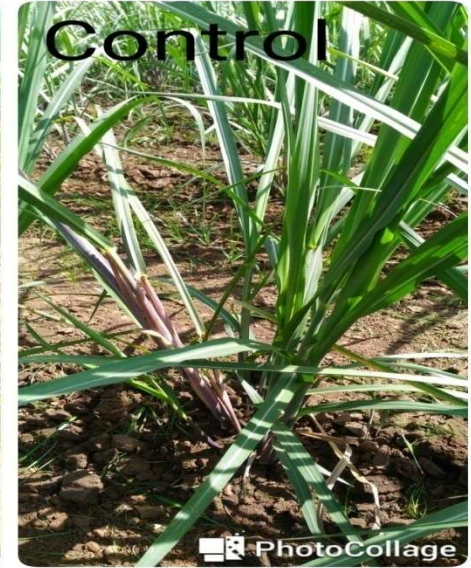
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Success Stories: Produce Quality and Yield



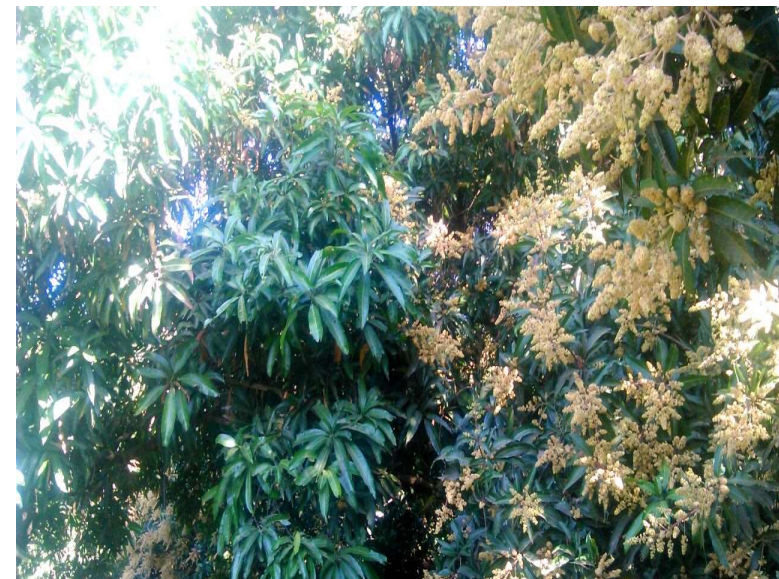
Control

Treated



Control

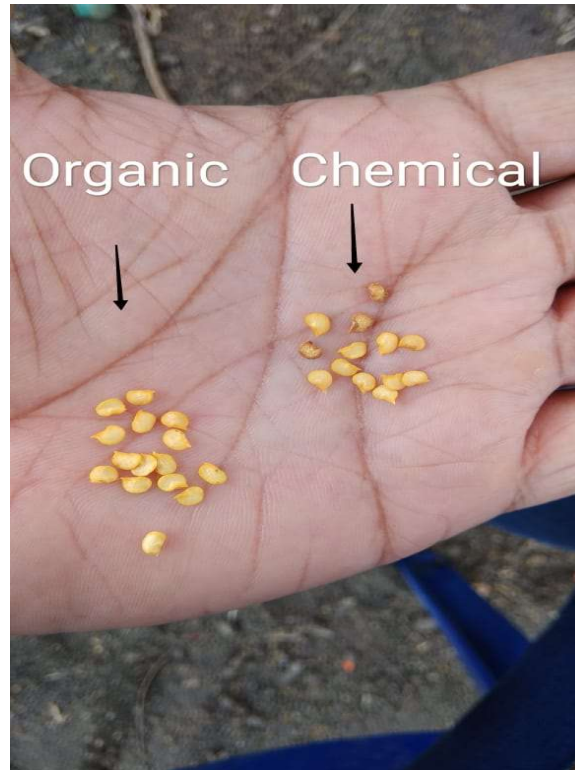
Treated



Success Stories: Produce Quality and Yield



Success Stories: Produce Quality and Yield



Success Stories: Biotic Stress Management



Control



Treated

Reduction
Sucking Pest
Infestation



Paddy BPH
Infestation
Reduction

Decentralized Organic Fertilizer Units

MYTH 1:

- By adopting organic cultivation methodology, the productivity will come down.

MYTH 2:

- Productivity Increase is based on Chemical Fertigation & Precision

Decentralized Organic Fertilizer Units



“The NEW GENERATION food security concept”



By enriching soil health, our Mother Land would give us back better yields



The time has come to understand the REAL TIME soil problems & address them



This is the time to adopt and implement new age 4th Generation agricultural technology – the technology may be termed as new age “BIO DYNAMIC” cultivation technology.