

Revised New Technical Programme after CJA

[Nanobiotechnology]

1.	Title	:	Development of nitrogen nano-fertilizers and its efficacy testing in paddy
2.	Background information	:	The agricultural zones of world are facing the challenges such as low crop yields, low nutritional value, diminishing of soil organic matter and water availability to feed the increasing population of world. In this connection, farmers apply more chemical fertilizers which results into reduction of natural resources. Hence, nanotechnology may have the potential to minimize nutrient losses through leaching, and avoid rapid changes in their chemical nature, thus enhancing nutrient use efficiency and addressing fertilizer environmental concerns by using nanofertilizers. Basically, Nanofertilizers are nutrient fertilizers composed, in whole or part, of nanostructured formulation(s) that can be delivered to the plants, allowing efficient uptake or slow release of active ingredients. Urea coated hydroxyapatite was successfully used for the slow release of nitrogen to rice crop (Kottegoda <i>et. al.</i> , ACS Nano, 2017). Furthermore, R. Liu and R. Lal have successfully used apatite nanoparticles as a phosphorus fertilizer for soybean with increasing growth rate and seed yield by 32.6% and 20.4%, respectively (Sci. Rep, 2014). Our aim is to develop metal oxide and carbon based nanofertilizers and study their effect on crop yield.
3.	Objective	:	<ol style="list-style-type: none">1. To develop nitrogen based nano-fertilizers.2. To evaluate efficacy of nitrogen based nano-fertilizers in paddy under pot study.
4.	Principal Investigator & Associates	:	<ol style="list-style-type: none">1) Dr. V. N. Mehta, Assistant Professor2) Dr. V. S. Prajapati, Assistant Professor3) Dr. R. L. Leva, Associate professor4) Dr. R. M. Patel, Principal and Dean
5.	Location and Agro-climatic zone	:	Aspee Shakilam Biotechnology Institute, NAU, Surat. South Gujarat Heavy Rainfall Zone-II
6.	Name of Research Scheme & B. H.	:	Establishment of Gujarat Agricultural Biotechnology Institute and women Training center on Tissue Culture (B. H. 12248)
7.	Year of commencement and season	:	2018-19
8.	Crop and Variety	:	Paddy Variety: NAU R-1
9.	Experimental Details	:	<ol style="list-style-type: none">1. Synthesis of nitrogen based nanofertilizers.2. Application of different concentration of nanofertilizers on crop yield.3. Stages of application: 50% at the time of seedling transplanting, 25% at the active tillering and the rest 25% in the panicle initiation stage.4. Effects of nanofertilizers on above-ground biomass (top), below-ground biomass (middle).5. Design: CRD6. Replications: 4

			<p>7. Different treatments</p> <p>T₁ : 100 % RDN</p> <p>T₂ :100 % nanofertilizers</p> <p>T₃: 75% nanofertilizers</p> <p>T₄: 50% nanofertilizers</p> <p>T₅ :25% nanofertilizers</p>
10.	Observations to be recorded	:	<p>1. Characterization of nanofertilizers</p> <p>2. Estimation of nitrogen content before planting and after harvest.</p> <p>3. Studies on release kinetics of nanofertilizers</p> <p>4. Effect of different treatment</p> <p>T₁ :100 % RDN</p> <p>T₂: 100 % nanofertilizers</p> <p>T₃: 75% nanofertilizers</p> <p>T₄: 50% nanofertilizers</p> <p>T₅: 25% nanofertilizers</p> <p>5. Studies of growth parameters (Plant height, Total effective tiller/hill, Panicle length (cm), No. of field grains/panicle, Test weight, Grain yield/hill, Straw yield/hill)</p>
11.	Expected outcome	:	The amount of fertilizer used can be decreased by using the nanofertilizers.