

New Technical Programme

[Nanobiotechnology]

1.	Title	:	Development of colorimetric sensors for the pesticides in agricultural produces
2.	Background information	:	Pesticides act as toxic compounds to all living organisms and hence used to control the insects, weeds, nematodes and other various pests. The pesticides can be carcinogenic in nature, which can produce disorders in bone marrow and nervous system and can sometimes cause infertility and respiratory diseases (Sci. Rep., 2020). Therefore, the trace level determination of pesticides is an important issue to be addressed. Generally, the use conventional techniques like HPLC, AAS, GC, GF-AAS etc is limited as they often required highly sophisticated instrumentation and tedious sample preparation. Recently, metal nanoparticles have garnered a significant interest in various fields of science because of their size dependent optical properties, and they have shown a great impact in improving the analytical performance of UV-visible spectrometry, just like as sophisticated instruments. Surface modified metal nanoparticles (Au, Ag and Cu) have the potential to establish miniaturized colorimetric methods for assaying of wide variety molecules, offering the quantification of trace level target analytes via the color changes, which could be noticed with naked-eye. The interface between the ligand chemistry of metal nanoparticles and trace level pesticides is where the specific covalent and non-covalent interactions occur; therefore, a significant color change occurs in the metal nanoparticles via the aggregation of metal nanoparticles induced by pesticides. In this review, the role of ligand chemistry on the surfaces of metal nanoparticles (Au, Ag and Cu) for colorimetric detection of various pesticides (Food Chem., 2021).
3.	Objective	:	<ol style="list-style-type: none">1. To develop the nanoparticle based colorimetric probe.2. To evaluate selectivity and sensitivity of the developed probe.
4.	Principal Investigator & Associates	:	<ol style="list-style-type: none">1) Dr. V. N. Mehta, Assistant Professor (PI)2) Dr. V. S. Prajapati, Assistant Professor (Co-PI)3) Dr. Sanjay Jha, Principal and Dean (Co-PI)
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 ASPEE SHAKILAM Biotechnology Institute (B. H. 12248)
7.	Year of commencement and season	:	2022-23
8.	Crop and Variety	:	Mango and Okra
9.	Statistical Design	:	T-Test
10.	Experimental	:	<ol style="list-style-type: none">1. Synthesis of nanoparticles (Au or Ag).

	Details		<ol style="list-style-type: none"> 2. Functionalization of nanoparticles to develop the colorimetric probe. 3. Selectivity of colorimetric probe towards pesticides (Carbamate and Organophosphate). 4. Sensitivity of the colorimetric probe 5. Interference study 6. Application of colorimetric probe for real sample analysis (Mango and Okra)
11.	Observations to be recorded	:	<ol style="list-style-type: none"> 1. Characterization of functionalized nanoparticles 2. Selectivity study 3. Sensitivity study 4. Effect of pH 5. Real sample analysis (% Recovery and RSD)
12.	Expected outcome	:	The developed probe will able to detect the pesticides at trace level as compare the conventional technique.