NEW TECHNICAL PROGRAMME

1.	**Experiment no. and Title**	**:**	**Effect of foliar application of urea and nano urea on *rabi* grain sorghum**
2.	**Budget head**	**:**	12048
3.	**Collaborative department if Any,**	**:**	Department of Soil Science, N.A.U., Navsari
4.	**Background information**	**:**	Sorghum [*Sorghum bicolor* L. Moench] is the king of millets and considered the fourth cereal crops after maize, wheat and rice. It is an important food, feed and fodder crop. In India, the area under Sorghum is approximately 5127 lakh ha with an annual production of about 4370 lakh tonnes and an average productivity of 952 kg/ha. (GOI, 2021). In Gujarat, it is cultivated over an area of 84.88 lakh ha with a production and productivity of 115.33 lakh tonnes and 1359 kg/ha, respectively. (GOI, 2021). Nitrogen use and demand is continuously increasing day by day. Since, it is highly mobile, it is subject to greater losses from the soil-plant system. (Abd EI-Lattief, 2011). Even under better management practices 30-50% of applied nitrogen lost through different mechanism and hence, the farmer is compelled to apply more than the actual need of the crop to compensate the loss. In this context, we want to access the effects of sorghum productivity by the foliar application of urea fertilizer and modern Nano Urea over the conventional recommended dose of fertilizers. It is responsible for greenness, vigorous growth, and overall crop development; therefore, it must be available for plants in adequate amounts. Nano Urea and liquid fertilizers have emerged as promising alternatives for ensuring high crop yield while remaining environmentally friendly. Liquid Nano fertilizer is currently the best alternative to conventional urea fertilizer. The aim of these experiments is to study the effectiveness of urea and nano urea over use of conventional urea fertilizers by the foliar application at different crop growth stages, and try to know the response and fulfills its nitrogen requirement and leads to higher crop productivity and quality in comparison to conventional urea.

5.	**Objectives**	**:**	**1.** To study the efficiency of foliar spray of urea and nano urea on growth, yield and quality of *rabi* grain sorghum **2.** To study the nitrogen use efficiency
6.	**Principal Investigators and associates**	**:**	**1.** Dr. R. N. Mansuri, Asstt. Res. Sci., A.R.S., N. A. U., Mangrol **2.** Shri. K. A. Patel, Senior Res. Asst., A.R.S., N. A. U., Mangrol **3.** Dr. H. N. Der, Asstt. Res. Sci., MSRS, N.A.U., Surat **4.** Dr. Narendra Singh, Asstt. Res. Sci., Dept. of Soil Science, N.A.U., Navsari
7.	**Location and Agro climatic sub region**		Agricultural Research Station, N.A.U., Mangrol, Surat South Gujarat zone
8.	**Year and season**	**:**	2023-24, *Rabi*
9.	**Crop and Variety**	**:**	Grain sorghum, GJ 101 / Phule Revati / GNJ 1 (As per availability)
10.	**Experimental details**	**:**	
	Treatments		
	T_1	**:**	Absolute Control
	T_2	**:**	100 % RDN
	T_3	**:**	50 % RDN at basal + 25 % RDN at 30 DAS + FSU @ 2 % at 35 DAS and flowering initiation
	T_4	**:**	50 % RDN at basal + 50 % RDN at 30 DAS + FSU @ 2 % at 35 DAS and flowering initiation
	T_5	**:**	50 % RDN at basal + FSNU @ 2 ml/l at 35 DAS and flowering initiation
	T_6	**:**	50 % RDN at basal + FSNU @ 4 ml/l at 35 DAS and flowering initiation
	T_7	**:**	50 % RDN at basal + 25 % RDN at 30 DAS + FSNU @ 2 ml/l at 35 DAS and flowering initiation
	T_8	**:**	50 % RDN at basal + 25 % RDN at 30 DAS + FSNU @ 4 ml/l at 35 DAS and flowering initiation
	T_9	**:**	50 % RDN at basal + 50 % RDN at 30 DAS + FSNU @ 2 ml/l at 35 DAS and flowering initiation
	T_{10}	**:**	50 % RDN at basal + 50 % RDN at 30 DAS + FSNU @ 4 ml/l at 35 DAS and flowering initiation
	FSU – Foliar spray of urea and **FSNU** – Foliar spray of nano urea		
	Note: Phosphorous will be applied as 100 % RDF in all treatments Protected spray of nano-urea application with flat fan / flood jet nozzle.		
	a.	Treatments	**:** Ten
	b.	Experimental Design	**:** Randomized block design
	c.	Replication	**:** Three
	D.	Plot size	**:** Gross plot – 4.50 m x 4.50 m (Row - 10)
			Net plot – 3.60 m x 3.90 m (Row - 8)
	e.	Spacing	**:** 45 x 15 cm
	F.	Seed rate (kg/ha)	**:** 10 kg/ha
	G.	Manures and fertilizers	**:** 80 – 40 – 00 kg/ha

				Seed treatment: Bio fertilizer (*Azospirillium* + PSB 10 ml each per kg seed)
	H.	Any other details if required,	**:**	**-**
11.	**Observation to be recorded**		**:**	1. Plant population (Initial and at harvest) 2. Days to 50% flowering 3. Plant height at harvest (cm) 4. Days to physiological maturity 5. Ear head length (cm) 6. 100 seed weight (g) 7. Grain yield (kg/ha) 8. Stover yield (kg/ha) 9. Harvest index (%) 10. Chlorophyll content before and after nano urea application 11. Protein content 12. NPK content and uptake by plants 13. NUE (Nitrogen use efficiency) 14. Available N from soil
12.	**Methodology**		**:**	**-**