

**Original Research Article**  
**IMPACT OF FOLIAR NUTRITION APPLIED AT  
DIFFERENT GROWTH STAGES ON NIGER  
(*Guizotia abyssinica* L.)**

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**ABSTRACT**

A field experiment was conducted during *Rabi* season of 2021-22 at Niger Research Station, NAU, Vanarasi, Gujarat to study the effect of foliar spray of nutrients applied at different growth stages on *niger* (*Guizotia abyssinica* L.). The experiment was laid out in randomized block design with three replications. The treatments consisted of seven treatments including foliar spray of 19:19:19 and Novel organic liquid (A Patented NAU product) applied at different growth stages on niger crop. The experimental results revealed that foliar application 1% 19:19:19 applied at flowering and capitula formation stage recorded significantly higher number of branches per plant. The number of seeds per capitulum and seed yield also remained significantly higher with the application 1% 19:19:19 applied at flowering and capitula formation stage which was found at par with treatment receiving foliar spray of 1% 19:19:19 at flowering stage and foliar spray of 1 % novel organic liquid at flowering stage.

*Keywords: Niger crop, Foliar spray, 19:19:19, Novel organic liquid*

**1. INTRODUCTION**

Oilseeds occupy a key place in agricultural economy of India, constituting an important group of crops next to cereals. Niger (*Guizotia abyssinica* L.) is believed to have originated from Ethiopia where it was domesticated from about 2000 BCE, and then spread to India. In India, Niger is grown on an area of 2.61 lakh ha mainly during *kharif*. Andhra Pradesh, Assam, Chhattisgarh, Gujarat, Jharkhand, Karnataka, Madhya Pradesh, Maharashtra, Odisha and West Bengal are the other states where niger is grown. The average yield in India is 3.21 q/ ha. Niger seeds contains edible oil (38 to 43%), protein (18 to 24%), sugar (12%) and minerals essential for human and animal meals. The main aim of foliar fertilization is to eliminate "hidden hunger", which is a very important consideration in high-input production systems and during critical stages of growth when roots are unable to assimilate the required amounts of nutrients, even in fertile soils. One of the best foliar fertilizers 19:19:19 for crop like pulses, vegetables, paddy for green house cultivation, nurseries, kitchen garden and for all types of field crop. Use of 19:19:19 result in cost saving and at the same time significantly increases the yield. Economic benefit ultimately matters for farmers and novel organic liquid nutrient plays an important role to improve it, (Singhal *et al.*, 2015). Novel organic liquid nutrient is a product of Navsari Agricultural University, Navsari, Gujarat which was patented in the year of 2012. Since foliar nutrient usually penetrate the leaf cuticle or stomata and enter the cell facilitating easy and rapid utilization of nutrients, so foliar nutrition on niger helps in achieving the optimum grain yield of niger.

## 2. MATERIAL AND METHODS / EXPERIMENTAL DETAILS / METHODOLOGY

The field experiment entitled effect of foliar nutrition applied at different growth stages on *rabi* niger (*Guizotia abyssinica* L.) was conducted during *Rabi* season of the year 2021-22 at Niger Research Station, Navsari Agricultural University, Vanarasi. The soil of the experimental field was clayey in texture with medium in available nitrogen, low in available phosphorus and high in available potassium and moderately alkaline in reaction. The experiment was laid out in randomized block design with three replications. The treatments consisted of seven levels of foliar nutrition applied at different growth stages of niger crop viz., F<sub>1</sub>: foliar spray of water (Control), F<sub>2</sub>: 1% 19:19:19 at flowering stage, F<sub>3</sub>: 1% 19:19:19 at capitula formation stage, F<sub>4</sub>: 1% 19:19:19 at flowering and capitula formation stage, F<sub>5</sub>: 1% Novel organic liquid at flowering stage, F<sub>6</sub>: 1% Novel organic liquid at capitula formation stage, F<sub>7</sub>: 1% Novel organic liquid at flowering and capitula formation stage. The niger cultivar GNNIG-3 was fertilized with recommended dose 20 kg N and 20 kg P<sub>2</sub>O<sub>5</sub>. At the time of sowing Nitrogen was supplied through urea while phosphorus supplied through single super phosphate.

**Comment [amr1]:** Under irrigation or rainfed conditions?

## 3. RESULTS AND DISCUSSION

### 3.1 Growth parameters in niger as influenced by foliar nutrition applied at different growth stages

Data presented in Table 1 indicated that plant height was not affected significantly due to different foliar nutrition treatment at 30, 60 DAS and at harvest. The plant height at 30 DAS and at harvest were recorded higher with foliar application of 1% novel organic liquid at flowering stage (13.40, 79.20 cm). While, at 60 DAS it was recorded higher with foliar spray of 1% 19:19:19 at flowering stage (F<sub>2</sub>) (51.07 cm). Although plant height did not differ statistically, but numerical values showed higher plant height in all the foliar nutrition treatments at harvest stage compared to control (F<sub>1</sub>). Foliar spray of 1% 19:19:19 at flowering and capitula formation stage (F<sub>4</sub>) showed significantly higher number of branches per plant at harvest stage (6.13) across all the treatments. Treatment F<sub>4</sub> was found at par with treatment 1% 19:19:19 at flowering stage (F<sub>2</sub>) and treatment 1% novel organic liquid at flowering stage (F<sub>5</sub>).

It might be due to hastening various metabolic process viz., photosynthesis, symbiotic biological N<sub>2</sub> fixation process due to nutrient availability at the initial stage of the crop. Further, phosphorus present in 19:19:19 fertilizer absorbed directly by the plant might have increased cell division and cell development leading to more number of branches. Similar results were obtained by Shwetha *et al.* (2018) in groundnut crop Banasode and Math (2018) and Deshmukh *et al.* (2023) in soybean.

### 3.2 Yield attributes in niger as influenced by foliar nutrition applied at different growth stages

Data furnished in Table 2 indicated that significantly higher number of seeds per capitulum (27.76) was recorded with foliar spray of 1% 19:19:19 at flowering and capitula formation stage (F<sub>4</sub>) and was found at par with rest of foliar nutrition treatments except 1% novel organic liquid at capitula formation stage (F<sub>6</sub>) and foliar spray of water (control) (F<sub>1</sub>). The lowest number of seeds per capitula (20.03) were recorded with foliar spray of water (control) (F<sub>1</sub>). Significantly higher seed yield (514 kg/ha) was recorded with foliar spray of 1%

19:19:19 at flowering and capitula formation stage (F<sub>4</sub>) and was found at par with 1% 19:19:19 at flowering stage (F<sub>2</sub>), 1% Novel organic liquid at flowering and capitula formation stage (F<sub>7</sub>) and 1% Novel organic liquid at flowering stage (F<sub>5</sub>). While, significantly the lower seed yield (379kg/ha) was recorded with foliar spray of water (F<sub>1</sub>). The increase in yield due to foliar nutrition treatment in F<sub>4</sub>, F<sub>2</sub>, F<sub>7</sub> and F<sub>5</sub> as compared to control (F<sub>1</sub>) was 35%, 27%, 23% and 21%, respectively.

It might be due to the foliar application of 19:19:19 that increased number of branches, capitula per plant and seeds per capitulum which directly relate to seed yield per plant and production per unit area. Further, foliar spray may have increased the photosynthetic activity and delays the senescence of leaves, which enhances the supply of photosynthate available for grain filling, resulting in more number of capitula per plant and ultimately seed yield. The results are in confirmation with findings of Krishnaveni *et al.* (2021) and Monika *et al.* (2021) in sesame crop; Bodke *et al.* (2022) and Deshmukh *et al.* (2023) in soybean crop. Novel organic liquid nutrients which provide nutrient supply as well as growth promoting hormones. Application of novel at early growth stages thus might have improved growth and development of the crop resembling in number of branches, capitula per plant and seeds per capitula, which is further reflected in increase of seed yield. Similar finding was reported by Singhal *et al.* (2015) and Champaneri *et al.* (2021).

Table 1: Growth parameters in niger as influenced by foliar nutrition applied at different growth stages

Treatments	Plant height (cm)			Number of branches
	30 DAS	60 DAS	At harvest	
F <sub>1</sub> :Foliarsprayofwater(control)	13.02	50.33	73.17	4.63
F <sub>2</sub> :1%19:19:19 atfloweringstage	12.73	51.07	78.77	5.87
F <sub>3</sub> :1%19:19:19atcapitulaformationstage	12.38	47.90	76.73	5.27
F <sub>4</sub> :1%19:19:19atfloweringandcapitula formation stage	13.05	50.48	97.07	6.13
F <sub>5</sub> :1% Novel organic liquid atflowering stage	13.40	50.89	79.20	5.93
F <sub>6</sub> :1%Novelorganicliquidatcapitulaformationstage	11.93	46.20	75.10	5.20
F <sub>7</sub> :1% Novel organic liquid at flowering and capitula formation stage	12.98	50.20	78.93	5.80
SEM±	0.38	1.88	2.91	0.23
CDat5%	NS	NS	NS	0.73
CV%	5.3	6.6	6.5	7.5

Table 2: Yield attributes in niger as influenced by foliar nutrition applied at different growth stages

Treatments	Number of seed per capitulum	Seed yield (kg/ha)
F <sub>1</sub> :Foliarsprayofwater(control)	20.03	379
F <sub>2</sub> : 1%19:19:19 atfloweringstage	25.87	482
F <sub>3</sub> : 1%19:19:19atcapitulaformationstage	22.72	426
F <sub>4</sub> : 1%19:19:19atfloweringandcapitula formation stage	27.76	514
F <sub>5</sub> : 1% Novel organic liquid atflowering stage	25.13	462
F <sub>6</sub> : 1%Novelorganicliquidatcapitulaformationstage	21.74	418
F <sub>7</sub> : 1% Novel organic liquid at flowering and capitula formation stage	25.65	468
SEm±	1.05	24
CDat5%	3.25	74
CV%	7.6	9.2

#### 4. CONCLUSION

On the basis of one year field experiment, it can be concluded that spraying of 1% 19:19:19 or 1% novel organic liquid at flowering stage may be done for getting profitable niger production.

**Comment [amr2]:** It will be interesting to know if this foliar product is available to agricultural producers of this plant.

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**Comment [amr3]:** Increase the number of citations to better support research results (especially *reserch on Guizotia abyssinica* L.).

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