*Available online at* www.ijpab.com

DOI: http://dx.doi.org/10.18782/2320-7051.6139

**ISSN: 2320 – 7051**

*Int. J. Pure App. Biosci.* **6 (3):** 61-64 (2018)

*Research Article*

International Journal of Pure & Applied Bioscience

OPEN ACCESS

# Varietal Assessment and Variability Studies in Niger [*Guizotia abyssinica* (L.F.) CASS.] Genotypes under Satpura Plateau of Madhya Pradesh, India

**V. N. Tiwari[1] and Aruna Devi Ahirwar[2*]**

[1]Principal Scientist & Project In-Charge AICRP on Niger, JNKVV, Zonal Agricultural Research Station, Chhindwara (Madhya Pradesh) – Pin code - 480 001, India

[2]Technical Assistant* in AICRP on Niger, JNKVV, Zonal Agricultural Research Station, Chhindwara (Madhya Pradesh) – Pin code- 480 001, India

*Corresponding Author E-mail: ahirwar_aruna@rediffmail.com

Received: 3.01.2018 | Revised: 10.02.2018 | Accepted: 16.02.2018

**ABSTRACT**

*An experiment was conducted at the JNKVV, Zonal Agricultural Research Station, Chhindwara , Madhya Pradesh, during kharif season of 2015 and 2016 to evaluate the potentials of five niger varieties developed at the centre. The varieties differed significantly for all the traits. The presence of wide genetic variability provides an indicating of a better scope for genetic improvement. JNS-28 showed highest number of branches/plant (10.85), whereas JNS-30 showed highest number of capitula/plant (43.7), number of leaves/plant (44.7), leaf width (4.85), 1000 seed weight (4.9) and yield/plant (12.85). JNC-6 showed highest number of seeds/capitulum, plant height and leaf length. The PCV was higher in magnitude than that of GCV for all the characters studied. Heritability in broad sense was highest for number of capitula/plant (99.88). High heritability coupled with high genetic advance was observed for number of leaves/plant (99.2 and 20.1). Present study demonstrated the superiority of JNS-30 over other varieties in terms of No of capitula/plant (10.85), 1000 seed weight (4.9) and Yield/plant (12.85) and having better growth and quality*

***Key words:*** *Niger varieties, Niger, PCV, GCV, Genetic advance*

## INTRODUCTION

Niger [*Guizotia abyssinica* (L.F.) Cass.] is an important minor oilseed crop grown in tropical and subtropical countries like India, Ethiopia, East Africa, West Indies and Zimbabwe. The belongs to the VI centre of origin of cultivated plants, the Abyssinian centre, along with other oilseeds, such as safflower, sesame and castor. India ranks first in area, production and export of niger in the world. It is the lifeline of tribal agriculture and economy in India. It is grown by tribal's on marginal and sub marginal lands with negligible inputs under rain fed condition[4]. About 42 per cent population under satpura plateau of M.P. state belongs to scheduled tribes. Niger considered a minor oilseed crop is important in terms of its 32 to 40 per cent of quality oil with 18 to 24 per cent protein in the seed.

**Cite this article:** Tiwari, V.N. and Ahirwar, A.D., Varietal Assessment and Variability Studies in Niger [*Guizotia abyssinica* (L.F.) CASS.] Genotypes under Satpura Plateau of Madhya Pradesh, India, *Int. J. Pure App. Biosci.* **6(3):** 61-64 (2018). doi: http://dx.doi.org/10.18782/2320-7051.6139

Niger is an important oilseed in Ethiopia where its provides about 50-60 per cent of the oil for domestic consumption[6]. Niger oil is slow drying, used in food, paint, soap and as an illuminant. The oil is used in cooking as a ghee substitute. The oil is also used to treat burns and in the treatment of scabies. The oil is considered good for health. Whole plants are used as green manure in the pre flowering stage. Niger has good potential for soil conservation, land rehabilitation and as a bio fertilizer, consequently the crop following niger is always good. These attributes favour its cultivation on hilly areas, marginal and sub marginal lands and around the forest[4].

## MATERIAL AND METHODS

Field study was conducted at the Zonal Agricultural Research Station, Chhindwara , Madhya Pradesh, during kharif season of 2015 and 2016 to evaluate the potentials of five niger varieties developed at the centre and popularly cultivated in M.P Chhindwara comes in satpura plateau of M.P. with typical climate scenario. It is located at $21^0$ 10' and $21^0$21' N and $78^0$ 28' and $79^0$ 25' E. It has an average elevation of 683 m. The annual rainfall 980 mm . Five niger varieties JNC-1, JNC-6, JNS-9, JNS-28 and JNS-30 comprised the experimental materials. The experimental design used for the study was a RBD, replicated two times. Standard cultural practices were followed throughout the experimental period to give the niger varieties a favorable environment to fully express their genetic potentials. In each entry ten plants were randomly tagged and observation were recorded for nine characters i.e. Number of seeds/capitulum, number of productive branches/plant, number of capitula/plant, Plant height (cm), number of leaves/plant, Leaf lengh (cm), Leaf width (cm), 1000 seed weight (g) and seed yield per plant (g). The data was subjected to statistical analysis for genetic parameters. Genotypic coefficient of variance and Phenotypic coefficient of variance were calculated by the method suggested by Burton (1952), heritability in broad sence formula suggested by Hanson *et al*. (1956) and expected genetic advance given by Johnson *et al*. (1955). GCV, PCV, heritability %, and Genetic advance (GA) were computed by using following formulas.

PCV = Square root of phenotypic variance (PV) X 100/ Grand mean

GCV = Square root of genotypic variance (GV) X 100/ Grand mean

Heritability % ($h^2$) = Genotypic variance (GV)/ Phenotypic variance (PV) X 100

Genetic advance (GA) = Square root of phenotypic variance (PV) X $h^2$ X K

Where K is the differential selection and value for K is 2.06 (in broad sense)

## RESULTS AND DISCUSSION

The results on analysis of five varieties for 9 yield and its attributing traits under study are summarized in table-1. All varieties differed significantly for all the traits. The result suggests the presence of tremendous variation among the five cultivars studied. The presence of wide genetic variability provides an indication of a better scope for genetic improvement.

**Mean performance**: Mean performance for yield parameters varieties shown variation. Number of branches/plant ranged from 6.95 (JNS-9) to 10.85 (JNS-28), number of caipula/plant ranging from 21.1 (JNS-9) to 43.7 (JNS-30), number of seeds/capitulum ranging from 27.9 (JNS-9) to 35.25 (JNC-6), TGW ranging from 4.9g (JNS-30) to 4.05g (JNC-6), and seed yield /plant ranging from 12.85g (JNS-30) to 10.2g (JNC-6). For growth parameters varieties shown variation from 77.55 (JNS-28) to 90.15 (JNC-6) for plant height, 20.85 (JNC-6) to 44.7 (JNS-30) for number of leaves/plant. For leaf length ranging from 12.2 (JNS-9) to 12.9 (JNC-6) and 3.8 (JNC-1) to 4.8 (JNS-30) for leaf width. Yield and yield attributing traits of the important criteria for farmers. JNS-28 (10.85) showed highest number of branches/plant, whereas JNS-30 showed highest number of capitula/plant (43.7), number of leaves/plant (44.7), leaf width (4.85), 1000 seed weight (4.9) and yield/plant (12.85). JNC-6 showed highest number of seeds/capitulum, plant

height and leaf length. JNS-9 showed lowest number of branches/plant, number of capitula/plant (21.1), number of seeds/capitulum (27.9) and leaf length (12.2).

**Table1: Analysis of variance (Mean Sum of Squares) of Niger varieties for various characters (Pooled of 2015 and 2016)**

| Source | df | $X_1$ | $X_2$ | $X_3$ | $X_4$ | $X_5$ | $X_6$ | $X_7$ | $X_8$ | $X_9$ |
|---|---|---|---|---|---|---|---|---|---|---|
| Rep. | 1 | 0.196 | 0.036 | 1.93* | 0.1 | 0.84 | 0.049 | 0.064 | 0.009 | 0.019 |
| Varieties | 4 | 5.096***** | 153.93***** | 15.23***** | 47.39***** | 190.74***** | 0.179***** | 0.346***** | 0.233***** | 2.064***** |
| Error | 4 | 0.391 | 0.218 | 0.063 | 1.09 | 1.46 | 0.049 | 0.036 | 0.011 | 0.217 |

**Table 2: Per se performance of Niger varieties for yield and yield attributing traits (Pooled of 2015 and 2016)**

| Varieties | $X_1$ | $X_2$ | $X_3$ | $X_4$ | $X_5$ | $X_6$ | $X_7$ | $X_8$ | $X_9$ |
|---|---|---|---|---|---|---|---|---|---|
| JNS-28 | 10.85 | 38.7 | 31.4 | 77.55 | 37.1 | 12.8 | 4.3 | 4.85 | 11.85 |
| JNS-30 | 10.45 | 43.7 | 29.85 | 85.45 | 44.7 | 12.3 | 4.85 | 4.9 | 12.85 |
| JNS-9 | 6.95 | 21.1 | 27.9 | 86.35 | 24.05 | 12.25 | 3.95 | 4.55 | 10.8 |
| JNC-6 | 8.65 | 30.05 | 35.25 | 90.15 | 20.85 | 12.9 | 4.0 | 4.05 | 10.2 |
| JNC-1 | 8.4 | 29.65 | 29.8 | 81.2 | 34.65 | 12.4 | 3.8 | 4.7 | 10.9 |
| **Mean** | **9.06** | **32.64** | **30.84** | **84.14** | **32.27** | **12.53** | **4.18** | **4.6** | **11.33** |
| **CD** | **1.30** | **0.97** | **0.52** | **2.17** | **2.51** | **0.46** | **0.4** | **0.22** | **0.97** |
| **CV** | **6.90** | **1.43** | **0.81** | **1.24** | **3.74** | **1.76** | **4.5** | **2.32** | **4.11** |

$X_1$ = Number of branches/plant $X_2$ = Number of capitula/plant
$X_3$ = Number of seeds/capitulum $X_4$ = Plant height (cm)
$X_5$ = Number of leaves/plant $X_6$ = Leaf length (cm)
$X_7$ = Leaf width (cm) $X_8$ = 1000 seed weight
$X_9$ = Seed yield/plant (g)

**Genotypic and Phenotypic Coefficient of Variance:** GCV and PCV for yield and yield attributing characters are summarized in table 3. The PCV was higher in magnitude than that of GCV for all the characters studied. Channarayappa[2] reported high PCV for number of capitula/plant and low PCV for 1000 seed weight. The higher PCV and GCV recorded for number of capitula/plant (26.87 and 26.85) and number of leaves/plant (30.2 & 30.1), while it was low for number of branches/plant (8.8 &8.4), number of seeds/capitulum (8.9 & 8.8), plant height (5.77 & 5.71), leaf length (2.4 & 2.0), leaf width (9.9 & 9.4), 1000 seed weight (7.4 & 7.2) and seed yield/plant (9.0 & 8.5) exhibited low variation.

**Table 3: Genetic parameters for seed yield and its components in niger**

| Characters | Mean SEm+ | Range | GCV | PCV | H(bs) % | GA* |
|---|---|---|---|---|---|---|
| Number of branches/plant | 9.06 (0.442) | 6.95-10.85 | 8.44 | 8.8 | 92.5 | 3.0 |
| Number of capitula/plant | 32.64 (0.330) | 21.1-43.7 | 26.85 | 26.87 | 99.85 | 17.9 |
| Number of seeds/capitulum | 30.84 (0.178) | 27.9-35.25 | 8.9 | 8.94 | 99.57 | 15.5 |
| Plant height (cm) | 84.14 (0.74) | 77.5-90.15 | 5.7 | 5.77 | 99.7 | 9.9 |
| Number of leaves/plant | 32.27 (0.855) | 20.85-44.7 | 30.1 | 30.2 | 99.23 | 19.9 |
| Leaf length (cm) | 12.53 (0.156) | 12.2-12.8 | 2.0 | 2.4 | 73.23 | 0.44 |
| Leaf width (cm) | 4.18 (0.135) | 3.8-4.8 | 9.4 | 9.9 | 89.59 | 0.76 |
| 1000 seed weight (g) | 4.61 (0.075) | 4.0-4.9 | 7.2 | 7.4 | 95.68 | 0.66 |
| Seed yield/plant (g) | 11.33 (0.329) | 10.2-12.8 | 8.48 | 9.0 | 89.48 | 1.86 |

GCV = Genotypic coefficients of variance; PCV = Phenotypic coefficients of variance.
HBS = Heritability in broad sense; GA = Genetic advance

**Haritability and Genetic Advance :** Heritability in broad sence was highest for number of capitula/plant (99.88) Nayakar (1976), followed by plant height (99.7), number of seeds/capitulum (99.5), number of leaves/plant (99.2), 1000 seed weight (95.6) Nayakar (1976) and number of branches/plant (92.5). High heritability coupled with high genetic advance was observed for number of leaves/plant (99.2 and 20.1) indicating the predominance of additive gene action for these character. For number of branches/plant, plant height and 1000 seed weight, high heritability coupled with low genetic advance revealed predominance of non additive gene action. Moderate heritability with low genetic advance was observed for seed yield/plant[1] and leaf width, suggesting that environmental played major role in characters expression. The extent of variation and nature of performance of niger varieties under satpura plateau of Madhya Pradesh, provided useful information for selecting appropriate variety for cultivation. Present study demonstrated the superiority of JNS-30 over other varieties in terms of No of capitula/plant (10.85), 1000 seed weight (4.9) and Yield/plant (12.85) and having better growth and quality.

## REFERENCES

1. Borole and Patil, Genetic Variability, correlation and path analysis in niger. *Journal of Oilseeds Research*, **14(1):** Pp 40-43 (1997).
2. Channarayappa, Response to selection, correlation and path analysis in niger [*Guizotia abyssinica* (L.f.) cass.]. *Mysore Journal of Agriculture Sciences*, **21:** Pp 92-93 (1987).
3. Nayakar, N. V., Genetic variability and heritability for six quantitative characters in niger *[Guizotia abyssinica* (L.F.) Cass*.] Mysore Journal of Agricultural Sciences* **10:** Pp 553-558 (1976).
4. Ranganatha ARG Tripathi Anjay Jyotishi Alok, Paroha seema, Deshmukh M R and Shrivastava Nikhil, Strategies to enhance the productivity of sesame, linseed and niger. In : *Proceeding of Platinum Jubilee Celebrations*, UAS, Raichur. Pp.235-237 (2009).
5. Ranganatha ARG, Strategies for Sesame and Niger Developmental Programmes in India. Paper presented in DAC-GOI review, New Delhi. (India) Pp.124-127 (2009).
6. Riley, K. W. and Belayneh, H., Niger in Robbelen G, Downey P K and Ashri A (Ed). *Oil crops of the world*, Mc graw Hill publishing company, New York. Pp 394-403 (1989).