Available online at www.ijpab.com

DOI: http://dx.doi.org/10.18782/2320-7051.7739

ISSN: 2582 – 2845

Ind. J. Pure App. Biosci. (2019) *7*(4), 390-394

Research Article

Indian Journal of Pure & Applied Biosciences

Growth and Yield of Niger (*Guizotia abyssinica* Lf. Cass) as Influenced by Different Date of Sowing and Varieties

Shaikh, M.F.*, Mirza, I.A.B. and Shaikh, S.N.

Department of Agronomy, College of Agriculture, Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani - 431 402, Maharashtra, India

*Corresponding Author E-mail: mudassirshaikh00@gmail.com

Received: 5.07.2019 | Revised: 13.08.2019 | Accepted: 20.08.2019

ABSTRACT

The experiment was conducted in Kharif 2017 at Experimental Farm, Department of Agronomy, College of Agriculture, Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani. The soil was clayey in texture, low in Nitrogen, low in Phosphorus, rich in Potash and slightly alkaline in reaction. The experiment was laid out in split plot design with 3 replication and 16 treatments combination viz., In main plot four dates of sowing and in sub plot four varieties of niger. The date of sowing (D_1) MW 26 (25 June) recorded taller, higher mean plant height (cm), number of leaves plant^{-1}, number of branches plant^{-1}, Leaf area plant^{-1} (dm^2), Total dry matter (gm), yield attributes, seed yield, straw yield, biological yield, harvest index than rest of date of sowings; with respect to varieties (V_1) PNS-6 recorded taller, higher mean plant height (cm), number of leaves plant^{-1}, number of branches plant^{-1}, Leaf area plant^{-1} (dm^2), Total dry matter (gm), yield attributes, seed yield, straw yield, biological yield, harvest index, than rest of the varieties. The variety (V_2) GN-1 was found at par with variety (V_4) GNNIG-3 with respect to growth attributes as well as growth and yield attributes as well as yield.

Keywords: *Dates of Sowing, Growth, Niger, Varieties, Yield.*

INTRODUCTION

Niger (*Guizotia abyssinica* Lf. Cass) is an important oilseed crop grown in tropical and sub-tropical countries like India, Ethiopia, East Africa, West Indies and Zimbabwe. However, India and Ethiopia are two major Niger producing countries in the world. Although a minor oilseed crop in world its cultivation in India is of considerable importance for rainfed condition on poor soils of coarse texture, especially on hill slopes.

India is major Niger growing country accounting for more than 50 per cent of world's area and production. In India it is grown on area of 232.1 lakh ha with production of 76.17 lakh tones and an average yield 328 kg/ha. The most dominant niger growing area are Madhya Pradesh, Bihar, Maharashtra, Orissa, Karnataka and Tamil Nadu.

Cite this article: Shaikh, M.F., Mirza, I.A.B., & Shaikh, S.N. (2019). Growth and Yield of Niger (*Guizotia abyssinica* Lf. Cass) as Influenced by Different Date of Sowing and Varieties, *Ind. J. Pure App. Biosci. 7*(4), 390-394. doi: http://dx.doi.org/10.18782/2320-7051.7739

Though Orissa is leading state in area and production and Gujrat has highest productivity *i.e*., 750 kg ha^{-1} (Anonymous, 2015). India, niger is grown under low as well as high rainfall condition. In Maharashtra most of the area is under high rainfall areas of sahyadri hills. Further the area of this crop is relatively more where the soils are poor in fertility and topography is mostly undulating. Area under this as far as Maharashtra concern, the area is 16000 ha. with production of 3000 tonnes and average productivity of 188 kg ha^{-1} and in Marathwada region is 7.4 thousand ha. with production of 1.0 thousand tonnes and productivity is 252 kg ha^{-1} (Anonymous 2016). Niger seed is principally used for extraction of edible oil and contains 37 to 42 per cent oil. The oil is used for culinary purpose, manufacturing of paints, soft soaps and cosmetics. It is generally used as spice in chutney, pickles and ketchup for adding taste in diet. The inferior quality oil is used as illuminant.

Genotype of niger play an important role in determining the yield of a crop, the potential yield of varieties within its genetic limit is set by its environment. The release of new varieties of niger is major break through in achieving its increased production per unit area. Yield of these varieties can be further improved by providing optimum environment by manipulating agronomic practices. Varieties differ in their yield potential depending upon many physiological process which are controlled by both genetic makeup and the environment. Date of sowing determines the time available for vegetative growth before the onset of flowering, which is mainly influenced by photoperiod, sowing time determines the plant height, number of branches, flowering, capitula bearing habits.

The productivity of niger can be increased with suitable sowing time. The information on this aspect is meagerly available for this region. Therefore, the present investigation with four sowing dates (26, 28, 30 and 32 MW) and four different niger varieties (PNS-6, GN-1, GN-2 and GNNIG-3) in Marathwada region was proposed and undertaken at Department of Agronomy, VNMKV, Parbhani during *Kharif* season, 2017 entitled "Performance of Niger (*Guizotia abyssinica* Lf. Cass) varieties under varied weather condition of Marathwada region"

MATERIALS AND METHODS

The field investigation entitled "Performance of Niger (*Guizotia abyssinica* Lf. Cass) varieties under varied weather condition of Marathwada region" was conducted during *Kharif* 2017-2018 at Experimental Farm (Plot No. A-5), Department of Agronomy, College of Agriculture, VNMKV, Parbhani. The experimental field was leveled and well drained. The soil was clayey in texture, low in Nitrogen (172.00 kg ha^{-1}), low in Phosphorus (12.10 kg ha^{-1}), rich in Potash (464 kg ha^{-1}) and slightly alkaline in reaction. The environmental conditions prevailed during experimental period was favorable for normal growth and maturity of niger crop.

The experiment was laid out in Split plot design with sixteen treatment combination *viz*., In Main plot ; Date of sowing (D) :- (D_1) MW-26 (25 June to 01 July), (D_2) MW-28 (09 July to 15 July), (D_3) MW-30 (23 July to 29 July), (D_4) MW-32 (06 August to 12 August) and in Sub plot ; Varieties (V) :- PNS-6 (V_1), GN-1 (V_2), GN-2 (V_3), GNNIG-3 (V_4) were replicated thrice. Sowing of all niger varieties was done on as per the treatments by dibbling the seeds at spacing 30 cm x 10 cm. The recommended cultural practices and plant protection measures were taken. Fertilizer *viz.*, Nitrogen, Phosphorus and Potassium were applied to respective plots by using Urea, SSP and Muriate of Potash uniformly in the lines opened for sowing as per the treatments. The crop was harvested on (D_1) 26th Sep 2017, (D_2) 07th Oct 2017, (D_3) 13th Oct 2017, (D_4) 26th Oct 2017, respectively.

Five plants from each net plot were randomly selected and labeled for taking biometric observations at different growth stages. The same plants were harvested separately for post harvest studies. The plants from each net plot were threshed and seeds

were cleaned. The cleaned seeds obtained from each net plot were weighted in kg. After separation of seeds from biological yield, remaining material (stem + bhoosa) was considered as straw yield and its final weights were recorded in kg per net plot, which were then converted into straw yield (Kg ha^{-1}) by multiplying hectare factor.

The biological yield was recorded by using the following formula.

Biological yield= Seed yield + Straw yield

Harvest index indicates the efficiency of plant material to convert the photosynthate into the economic yield and it was worked out as

$$\text{Harvest index (\%)} = \frac{\text{Seed yield (Kg ha}^{-1}\text{)}}{\text{Biological yield (Kg ha}^{-1}\text{)}} \times 100$$

Where, straw yield = Stalks + leaves

The data obtained on various observations were tabulated and subjected to their analysis by using analysis of variance and the treatments were tested by F test (Panse & Sukhatme, 1967).

RESULTS AND DISCUSSION

Effect of sowing dates on growth attributes

The mean plant height (cm), number of leaves $plant^{-1}$, number of branches $plant^{-1}$, Leaf area $plant^{-1}$ (dm^2), Total dry matter (gm) were increased upto harvest. Sowing of niger crop at sowing dates of (D_1) MW-26 (25 June) produced the taller plant height, higher number of eaves $plant^{-1}$, number of branches $plant^{-1}$, Leaf area $plant^{-1}$ (dm^2), Total dry matter (gm) eaves $plant^{-1}$, number of branches $plant^{-1}$, Leaf area $plant^{-1}$ (dm^2), Total dry matter (gm) as compared to other sowing dates (D_2) MW-28 (10 July), (D_3) MW-30 (25 July), and (D_4) MW-32 (10 August) at harvest. The probable reason for this might be due to rapid phenological development due to photo periodical changes be due to lower plant density which has helped in producing maximum number of leaves and eventually higher leaf area and rest of the growth parameters. These findings are in line with the earlier findings by Misra & Sahu (1988), Thakur et al. (2000) and Kiwadasannawar et al. (2006), Kadam (2007) and Jagtap et al. (2015).

Effect of varieties on growth attributes

The mean plant height (cm), number of leaves $plant^{-1}$, number of branches $plant^{-1}$, Leaf area $plant^{-1}$ (dm^2), Total dry matter (gm) were increased upto harvest. Perusal of data in Table 2 indicated that variety PNS-6 (V_1) performed remarkably in achieving good growth attributes *viz.*, number of leaves (71.41), leaf area (7.53 dm^2), number of branches (12.12) and total dry matter accumulation (15.92 g $plant^{-1}$) followed by variety GN-1 (V_2), GNNIG-3 (V_4) and GN-2 (V_3). Variety (V_2) GN-1 is statistically similar with (V_4) GNNIG-3. In plant height (110.76 cm) recorded higher in variety GN-1 (V_2) as compared to other varieties. Similar finding were reported by Kumar et al. (2011) and Ukale (2014).

Effect of sowing dates on yield attributes, seed and straw yield

The sowing date (D_1) MW 26 (25 June) of Niger recorded significantly higher yield attributes *viz.*, Number of capsule $plant^{-1}$ (24.10), weight of capsule $plant^{-1}$ (2.61g), number of seeds $capsule^{-1}$ (12.20), number of seeds $plant^{-1}$ (268), weight of seed $plant^{-1}$ (0.92g), test weight (3.70g), seed yield (233 kg ha^{-1}), straw yield (1202 kg ha^{-1}), biological yield (1435 kg ha^{-1}) and harvest index (16.24%) and also recorded higher GMR, NMR and benefit : cost ratio followed by sowing date (D_2) MW-28 (10 July), (D_3) MW-30 (25 July) & (D_4) MW-32 (10 August). The favourable condition prevailed during (D_1) MW 26 (25 June). Similar finding were reported by Kumar and Kubsad (2014), Jagtap et al. (2015).

Effect of varieties on yield attributes, seed and straw yield

The variety PNS-6 (V_1) of Niger recorded significantly higher yield attributes *viz.*, Number of capsule $plant^{-1}$ (22.18), weight of

capsule plant^{-1} (2.41g), number of seeds capsule^{-1} (12.15), number of seeds plant^{-1} (236), weight of seed plant^{-1} (0.81g), test weight (3.67g), seed yield (216 kg ha^{-1}), straw yield (1080 kg ha^{-1}), biological yield (1296 kg ha^{-1}), and harvest index (16.66%). However, The variety PNS-6 (V_1) of niger recorded significantly higher GMR, NMR and Benefit : Cost ratio followed by varieties GN-1 (V_2), GNNIG-3 (V_4) & GN-2 (V_3). The variety PNS-6 (V_1) is more profitable for Marathwada region. Similar finding were reported by Kumar et al. (2011) and Ukale (2014).

Table 1: Growth attributes as influenced by different date of sowing and varieties at harvest

Treatments	Mean plant height (cm)	Mean number of functional leaves plant^{-1}	Mean leaf area (dm^2) plant^{-1}	Mean number of branches plant^{-1}	Mean dry matter accumulation plant^{-1} (g)
Main plot **Date of sowing (D)**					
D_1 : MW-26 (25 June)	138.06	30.43	4.74	14.84	18.08
D_2 : MW - 28 (10 July)	119.39	22.63	2.86	11.53	16.35
D_3 : MW-30 (25 July)	98.05	17.16	1.73	8.15	15.44
D_4 :MW-32 (10 August)	87.54	7.80	0.61	6.06	13.81
S.E. m ±	4.63	0.68	0.09	0.42	0.54
C.D. at 5 %	14.05	2.13	0.31	1.28	1.69
Sub plot **Varieties (V)**					
V_1 : PNS-6	79.74	23.41	2.98	12.16	19.10
V_2 : GN-1	132.91	21.85	2.78	11.35	17.83
V_3 : GN-2	106.32	14.04	1.78	7.30	11.46
V_4: GNNIG-3	124.05	18.72	2.38	9.73	15.28
S.E. m ±	4.11	0.64	0.08	0.35	0.52
C.D. at 5 %	12.07	1.97	0.26	1.07	1.62
Interaction (D x V)					
S.E. m ±	8.12	1.24	0.16	0.71	0.98
C.D. at 5 %	NS	NS	NS	NS	NS
General Mean	**110.76**	**19.51**	**2.48**	**12.12**	**15.92**

Table 2: Yield attributes of niger as influenced by various treatments

Treatments	No. of capsule plant^{-1}	Wt. of capsule plant^{-1} (g)	No. of Seeds capsule^{-1}	No. of seeds plant^{-1}	Wt. of seed plant^{-1} (g)	Test weight (g)
Main plot **Date of sowing (D)**						
D_1 : MW-26 (25 June)	24.10	2.61	12.20	268	0.92	3.70
D_2 : MW - 28 (10 July)	21.32	2.23	12.09	237	0.79	3.64
D_3 : MW-30 (25 July)	17.85	1.85	11.98	203	0.66	3.59
D_4 :MW-32 (10 August)	15.38	1.36	11.89	157	0.48	3.52
S.E. m ±	0.45	0.05	0.07	8.29	0.004	0.05
C.D. at 5 %	1.59	0.20	NS	29.27	0.015	NS
Sub plot **Varieties (V)**						
V_1 : PNS-6	22.18	2.41	12.15	236	0.81	3.67
V_2 : GN-1	19.89	2.10	12.06	224	0.73	3.62
V_3 : GN-2	17.27	1.49	11.92	186	0.59	3.55
V_4: GNNIG-3	19.27	2.05	12.02	220	0.72	3.60
S.E. m ±	0.42	0.06	0.06	2.36	0.004	0.04
C.D. at 5 %	1.24	0.18	NS	6.93	0.012	NS
Interaction (D x V)						
S.E. m ±	0.86	0.29	0.12	9.25	0.008	0.09
C.D. at 5 %	NS	NS	NS	NS	NS	NS
General Mean	**19.66**	**2.01**	**12.04**	**216**	**0.71**	**3.61**

Table 3: Seed yield, straw yield, biological yield (kg ha^{-1}) and harvest index (%) of niger as influenced by various treatments

Treatments	Seed yield (kg ha^{-1})	Straw yield (kg ha^{-1})	Biological yield (kg ha^{-1})	Harvest index (%)
Main plot **Date of sowing (D)**				
D_1 : MW-26 (25 June)	233	1202	1435	16.24
D_2 : MW - 28 (10 July)	192	1002	1194	16.08
D_3 : MW-30 (25 July)	155	816	971	15.97
D_4 : MW-32 (10 August)	95	503	598	15.89
S.E. m ±	3.56	20.50	22.25	-
C.D. at 5 %	12.56	72.32	78.52	-
Sub plot **Varieties (V)**				
V_1 : PNS-6	216	1080	1296	16.66
V_2 : GN-1	179	925	1104	16.22
V_3 : GN-2	123	683	806	15.26
V_4: GNNIG-3	157	836	992	15.81
S.E. m ±	4.49	22.58	32.66	-
C.D. at 5 %	13.19	66.29	95.90	-
Interaction (D x V)				
S.E. m ±	8.56	44.15	60.79	-
C.D. at 5 %	NS	NS	NS	-
General Mean	**169**	**881**	**1050**	**16.09**

REFERENCES

Anonymous, (2015). http/www.indiastat.com.

Anonymous, (2016). Area, production and productivity estimate of Niger in India in *kharif* (*monsoon*) http//www.indiastat.com.

Jagtap, P.K., Sandipan, P.B., Patel, K.M., & Patel, M.C. (2015). Growth and yield attributes in Niger as influence by sowing time. *International. J. Forestry & Crop Improv*., *6*(1), 12-15.

Kadam, P.B. (2007). Growth and yield of Niger *(Guizotia abyssinica* Cass*)* Sowing date as influenced by fertility level. M.sc (Agri) Thesis, MAU. Parbhani.

Kumar, M.B.N., Basavegowda., Vyakarnahal, B.S., Kenchangoudar, P.V., & Deshpande, V.K. (2011). Influenced of sowing dates on production of seed yield in Niger *(Guizotia abyssinica* Cass*)*. Karnataka *J. Agric. Sci*., *24*(3): 289-293.

Kumar, V.K.M., & Kubsad, V.S. (2014). Agrotechniques To Enhance The Productivity of Niger (*Guizotia Abyssinica*) under rainfed conditions . *Indian Journal of Agronomy*, *59*(4), 665-667.

Misra, R.C., & Sahu, P.K. (1988). Effect of dates of sowing and row spacing on yield and its components in Niger. *J. Oilseeds Res.*, *5*(2), 179-178.

Panse, V.G., & Sukhatme, P.V. (1967). Statistical methods for Agricultural workers, ICAR, New Delhi.

Ukale, G. U. (2014). Assessment of spacing and fertilizer levels in Niger (*Guizotia abyssinica* Cass*.)* M.Sc. (Agri.) Thesis, VNMKV, Parbhani.