



EFFECT OF SOWING DATE ON YIELD POTENTIAL OF NIGER CROP IN RAINFED CONDITION

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Abstract

A field experiment was conducted during the *kharif* seasons of 2008-09 to 2011-12 at Niger Research Station, Navsari Agricultural University, Vanarasi (Gujarat), India to determine the most suitable sowing date for niger crop. Seeds (5 kg/ha) of niger variety GN-1 were sown in RBD on 15th July, 25th July, 4th August, 14th August, 24th August and 4th September with a spacing of 30cm x 10cm and supplied with recommended dose of NPK. The results revealed that sowing on second fortnight of July (15th to 25th July) produced the highest seed yield (kg/ha) attributed mainly to the increased number of branches, capitula per plant and a high 1000-seed weight whereas delay in sowing leads to early flowering and maturity of niger crop might be due to favourable environmental conditions.

Key words : Sowing time, yield, growth, niger, rainfed condition, randomized block design.

Introduction

Niger (*Guizotia abyssinica* Cass.) being a minor oilseed crop of India, indigenous to tropical Africa particularly to Ethiopia islands, which occupies an area of one lakh ha with a production of 0.39 million tonnes and productivity of 320 kg per ha. India is considered to be the chief niger producing country in the world and mainly cultivated in Madhya Pradesh, Orissa, Maharashtra, Bihar, Karnataka, Andhra Pradesh and to some extent in hilly areas of Gujarat, Uttar Pradesh and Tamil Nadu and some parts of the Northeastern hilly regions of the country. Niger is commonly known as ramtil, kalatil, gurellu, tilangi, neak, noog and nug which contributes about three per cent to Indian oil seed. The niger seed oil is used for human food, medicines and manufacturing a number of industrial products. Its oilcakes are used as cattle feed and leaves add organic matter to the soil. Niger is grown as a rainfed crop extensively in marginal and sub marginal lands in tribal areas, hill top and slopes with low inputs due to lack of input responsive high yielding varieties. The important feature of this crop is that it gives reasonable seed yield even under poor marginal growing conditions. Further, lack of improved seed production technology and suitable high yielding varieties are the major causes for the low seed yield. Production potentiality of niger can be fully exploited with

suitable agronomic practices and genotypes. Among the different practices, sowing at optimum time plays an important role to exploit the full genetic potentiality of a variety as it provides optimum growing conditions such as temperature, light, humidity and rainfall. The growth phase of the crop should synchronize with optimum environmental conditions for better expression of growth, yield and its ancillary characters (Kumar *et al.*, 2013). Hence, the present investigation was undertaken to identify the best sowing time for quality and high seed production of niger.

Materials and Methods

The field experiment was laid out in randomized block design (RBD) with four replications conducted during *kharif*, 2008-09 to 2011-12 at Niger Research Station, Navsari Agricultural University, Vanarasi (Gujarat), India. The experimental material consisted of six different dates of sowing viz., D₁ - 15th of July, D₂ - 25th of July, D₃ - 4th of August, D₄ - 14th of August, D₅ - 24th of August and D₆ - 4th of September which were adjusted with 10 days of intervals. Seeds of niger variety GN-1 as a release variety of NRS, Vanarasi, NAU (Gujarat), India were sown with a spacing of 30cm x 10cm in net plot size of 3.6m x 2.4m. Before sowing, seeds were uniformly treated with bavistin (@ 2.5g/kg). Thinning was done after 15 days of germination to get desired plant population and spacing. Weeding was done manually after 35-40 days of sowing.

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Recommended dose of fertilizers (20:20:0, NPK kg/ha) were applied and all other agronomic as well as plant protection measures were carried out as per the package of practices for niger (Anonymous, 1988). The data on growth parameters *viz.*, days to 50 per cent flowering, days to maturity, plant height (cm), number of branches per plant and yield parameters *viz.*, number of capitula per plant, number of seeds per capitula, 1000 seed weight (g) and seed yield (kg/ha) were recorded for each year. The experimental data were statistically analyzed as per the methods suggested by Sundararajan *et al.* (1972).

Results and Discussion

The data presented in table 1 revealed that the growth parameters *viz.*, days to 50 per cent flowering, days to maturity, plant height and number of branches per plant was significantly influenced by different dates of sowing throughout all the four years. The pooled analysis for yield attributing traits (table 1) suggests that sowing on 15th of July (D₁) and 25th of July (D₂) showed late flowering (68, 66 days) and late maturity (117, 114 days) as compare to other sowing dates, whereas delay in sowing from D₃ (4th of August) to D₆ (4th of September) leads to earliness in both flowering and maturity (table 1). The variation in growth parameters *viz.*, earliness in flowering and maturity among the date of sowing might be due to the influence of environmental factors such as stress or less rainfall condition, temperature, sunshine, rainfall and relative humidity in late sown condition of the crop. Among the dates of sowing, sowing at 15th July (D₁) and 25th of July (D₂) recorded higher number of branches per plant (6, 6), number of capitula per plant (25, 26), more number of filled seeds per capitulum (24, 23) maximum 1000 seed weight (4.6, 4.6) than rest of the sowing dates. On the contrary, delay in sowing of niger from August to September (D₃ to D₆) recorded lowest number of branches, number of capitula per plant, number of filled seeds per capitulum and less 1000 seed weight (table 1). The graphical representation of influence of sowing time on growth parameters and yield contributing traits in niger is shown in figs. 1 and 2, respectively. The late sowing crop recorded significantly lower values in plant height, number of branches and reduction in the duration of vegetative and also reproductive phase due to soil moisture stress compared to early sown crop and this was also observed by Nayak and Paikaray (1991), Paul *et al.* (1995) and Agarwal *et al.* (1996) in niger.

Seed yield is the manifestation of morphological, physiological, biochemical aspects of growth parameters and is considered to be the result from the trapping and utilization of solar energy efficiency. Seed yield is

Table 1 : Effect of sowing time on the yield and yield attributing traits of niger during 2008-09 to 2011-12.

Treatments (Six sowing dates)	Yield attributing traits							Mean seed yield (kg/ha)				
	Plant height	Days to 50% flowering	Days to maturity	Branches /plant	No. of capitula/ plant	No. of filled seeds/ capitulum	1000 seed weight (g)	2008-09	2009-10	2010-11	2011-12	Pooled (4 years)
D ₁ -15 th of July	127	68	111	6	25	24	4.6	217	163	308	438	251
D ₂ -25 th of July	124	66	114	6	26	23	4.6	208	127	297	471	248
D ₃ -4 th of August	161	58	96	5	21	21	4.5	178	149	207	318	192
D ₄ -14 th of August	86	58	91	4	19	18	4.4	87	53	223	153	111
D ₅ -24 th of August	86	53	89	4	17	17	4.3	25	22	127	139	68
D ₆ -4 th of September	66	51	81	3	12	16	4.2	10	12	60	51	24
General Mean	108.33	59.0	97.0	4.66	20.0	19.83	4.43	120.8	87.7	203.7	261.7	149.0
S.Em.	0.60	0.48	0.50	0.29	1.14	0.79	0.026	11.9	18.2	17.0	22.1	28.0
CD 5 %	1.81	1.45	1.52	0.88	3.45	2.40	0.080	36.2	55.0	52.1	67.2	85.1
CV %	1.11	1.64	1.04	13.04	11.43	8.82	1.21	20.1	43.2	17.2	17.0	21.2

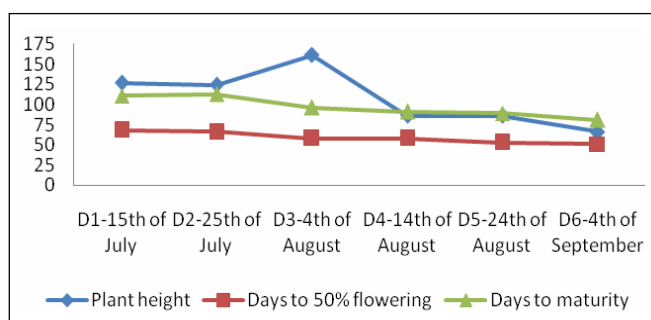


Fig. 1 : Effect of sowing time on growth parameters in niger.

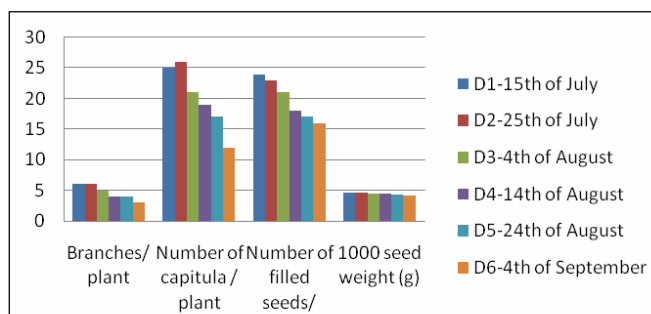


Fig. 2 : Effect of sowing time on yield contributing traits in niger.

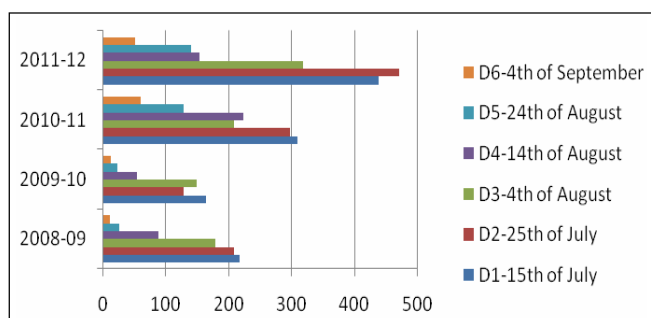


Fig. 3 : Yearwise seed yield performance as influenced by different date of sowing.

polygenic in nature and is influenced by several internal and external factors throughout the crops growth period and even during reproductive phase also. The fig. 3 shows year wise effect of sowing time on the seed yield (kg/ha) in niger. Similar variability in growth and yield parameters were documented by Mishra *et al.* (1991) in niger. The pooled analysis for seed yield (kg/ha) during four years (2008-09 to 2011-12) showed sowing of niger at Second fortnight of July (15 to 25th of July) recorded higher seed yield (251, 248 kg/ha) respectively followed by first fortnight of August (D₃; 4th of August) among all the sowing dates. The delay in sowing from D₄ (14th of August) to D₆ (4th of September) leads to gradual decrease in seed yield (kg/ha) also. The variation for seed yield might be due to variation in expression of characters fully in the favourable environmental conditions. The influence of dates of sowing was also

significantly noticed on seed quality parameters like 1000 seed weight. Seed Index were reported to higher in early sown crop (second fortnight of July) due to existence of favourable condition during grain filling stage in early sown crop compared to delayed sowings. These results are in agreement with findings of Saini *et al.* (1980) in soybean. The higher yield and seed quality parameters might be due to optimum temperature in early sown crop which was beneficial for the early establishment of crop and subsequent proper growth, resulting in producing more height, foliage and higher number of seeds per capitula which ultimately resulted in higher yield and seed quality and full expression of the varietal characters during favourable conditions, which existed during early sown crops. These results were also in conformity with the reports of Mishra *et al.* (1991) in niger and Babalad *et al.* (1996) in soybean. Hence, it is cleared from the study that growth and yield potential of niger crop is fully exploited during the sowing period from 15th July to 25th July *i.e.* second fortnight of July.

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