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SHORT COMMUNICATION

Early Maturing Niger Germplasm Accessions

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In order to have wide variability in niger breeding, augmentation and evaluation of 1800 niger accessions, including indigenous and exotic collections, was conducted in *rabi* season at five different locations of India, *viz*., Hyderabad (Telangana) in *kharif* and *rabi* seasons, Ranchi (Jharkhand), Akola (Maharashtra), Delhi (New Delhi) and Chinthapally, Araku (Andhra Pradesh). In all the locations, accessions IC0268292, IC0268293, IC0268294, IC0268295, IC 412911, IC411511, and IC305117 were found to be early for 50% flowering (30-40 days) and days to maturity (58-75 days) compared to the standard checks (JNS-9 and JNS-28). Seed yield in *kharif* season varied between 1.87 g/plant to 2.96 g/plant and in *rabi* season, it was 1.31 g/plant to 1.83 g/plant in the early accessions. These accessions can be further utilized in crosses with long-duration Ethiopian lines (which are late-types coupled with high yield) to select early and high yielding lines in the transgressive segregants.

Key Words: Early maturing, Evalution, Germplasm, Niger

Introduction

Niger [*Guizotia abyssinica* (L.f.) Cass.] a lesser-known annual oilseed crop is valued primarily for its nutritive edible oil while it has a wide range of uses from its edible oil to medicinal purposes. India and Ethiopia are the two major producers of niger in the world. Though the crop is native of Tropical Africa, it is widespread and cultivated extensively in India in the 19th century and known from the broker's report in London. Globally, it is cultivated in tropical and subtropical countries like Ethiopia, India, East Africa, West Indies, and Zimbabwe. India ranks first in area, production, and export of the niger globally. It forms an integral part of the tribal agriculture economy and supports bird feed industries which have great demand for the crop to export as bird feed, supports the apiary industry, and also adds to tourism especially in the Araku valley region of Andhra Pradesh by its aesthetic value. Niger as an oilseed crop, is important with its 32 to 40% edible oil and 18 to 24% protein in the seed. This crop is mainly grown by tribals on marginal, unproductive wastelands without any production management under rainfed conditions in India. As the crop is cultivated largely by tribal farmers, it has thus far remained neglected. There is an ever-increasing demand for edible oil in the country, and the niger crop may contribute to increasing oil production in the country by expanding its area under rice fallows during the *rabi.* This study constitutes the first attempt at characterization and evaluation of entire niger genetic material available in India.

Materials and Methods

Collection

A total of 1807 germplasm accessions under long-term storage in NBPGR were subjected to characterization and evaluation. These accessions includes indigenous collections (IC) collected through exploration and exotic collections (EC).

Characterization and evaluation

Systematic efforts were made for seed multiplication, characterization, and evaluation of the entire germplasm of both indigenous and exotic accessions in augmented block design using two national checks JNS-9 and JNS-

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Table 1. Performance of early flowering accessions at four different locations

S.No.	Locations and season	Days to flowering and maturity (Early accessions*)			Days to flowering and maturity in Checks (JNS-9, JNS-28)		
		Flower initiation (No. days)	50% flowering time	Days to maturity	Flower initiation	50% flowering time	Days to maturity
1.	Hyderabad, Telangana State (2019 *rabi*)	28	30	58	44	52	95
2.	Hyderabad, Telangana State (2020 *kharif*)	28	32	67	46	55	98
3.	NBPGR, New Delhi (2020 *rabi*)	31	36	70	42	50	90
4	Akola, Maharashtra (2020 *rabi*)	35	40	75	45	54	94
5	Ranchi, Jharkhand (2020 *rabi*)	25	30	55	40	50	85
6	Chinthapally, Andhra Pradesh (2020 *rabi*)	36	40	75	46	53	98
Standard Deviation		4.32	4.68	8.50	2.40	2.07	5.05

*: IC0268292, IC0268293, IC0268294 and IC0268295 at all locations. IC412911, IC411511, IC305117 at Akola, Maharashtra; IC49568 and IC206246 at Ranchi, Jharkhand

28. The evaluation was carried out at six locations, i.e., Hyderabad (Telangana) (18.11° N, 79.01° E), Ranchi (Jharkhand) (23.61° N, 85.27° E), Akola (Maharashtra) (20.20°N, 77.00° E), Delhi (New Delhi) (28.70°N, 77.00 °E) and Chinthapally, Araku (Andhra Pradesh) (18.3273° N, 82.8775° E). The crop was evaluated during 2019 *rabi* season at all locations, except Hyderabad, where it was assessed in 2020 *kharif* and *rabi* seasons. Flower initiation was recorded when heads started to open in each line; after attaining a minimum of 50% flowering in each line, data on 50% flowering was noted down. Physiological maturity in niger is considered as days to maturity and recorded the observation once heads started to turn a brown color. Data on seed yield per plant and percent oil content were also recored.

Results and Discussion

Among the 1807 accessions characterized, 50% flowering duration varied from 30-40 days, and four accessions *viz*., IC0268292, IC0268293, IC0268294 and IC0268295 (Fig 1) were found early for 50% flowering compared to the checks in all locations (Table 1). Additionally, IC412911, IC411511, and IC305117 also flowered early at Akola, Maharashtra; and IC 49568, IC 206246 at Ranchi, Jharkhand. All these accessions are mainly indigenous landraces from Maharashtra except one each from Madhya Pradesh (IC305117) and Jharkhand (IC206296). Early maturing accessions were found to be low seed yield and have low oil content. Hence, these accessions can be used as donors for early maturing trait.

The characterization and evaluation of niger genetic resources have resulted in identification of early maturing accessions which was confirmed at different locations. Variability for 50% flowering ranged from 73 to 83 days and for days to maturity ranged from 128 to 144 days in a study conducted by Jagadev and Salman (1991) in 14 cultivars which indicates that there are no early maturing cultivars. A study conducted by Jadhavar (2014) for genetic diversity in 40 niger genotypes found that range for 50% flowering varied from 56.5 days to 68 days and days to maturity was 96 days to 106 which indicated that there were no early maturing genotypes

Table 2. Performance of early flowering accessions for seed yield at Hyderabad, Telangana State (*Rabi* and *kharif* 2019)

S. No.	Accessions	Rabi		Kharif	
		Seed yield (g/plant)	Oil content (%)	Seed yield (g/plant)	Oil content (%)
1.	IC0268292	1.83	25.24	2.53	26.35
2.	IC0268293	1.31	23.61	2.11	24.72
3.	IC0268294	1.43	28.67	1.87	29.31
4.	IC0268295	1.36	27.36	2.96	27.34
5.	JNS-9 ©	3.99	35.12	5.26	35.61
6.	JNS-28©	4.16	33.95	4.71	34.29
Standard Deviation		0.24	2.24	0.48	1.92

Fig. 1. Early accessions IC0268292, IC0268293, IC268294 and IC268295

and similar results were observed by Singh and Patra (1989), Alemaw and Teklewold (1995), Pradhan *et al.* (1995), Sreedhar *et al*. (2005). Studies conducted in Ethiopian lines recorded three maturity groups in the niger germplasm – early maturing group (120-130 d), mid maturity group (140-150 d), and late maturity group (175-185 d) (Getinet and Sharma, 1996). Hence, this constitutes the first report of screening a large number of accessions for variability and identified early maturing niger accessions.

Conclusion

Early maturing accessions identified in the present study can be used as a source for pyramiding high seed yielding genotypes with early maturity by crossing them with late types having high yield. This is the first report of evaluating niger genetic resources for early flowering, and information generated would be useful to breeders in selecting transgressive segregants for high yielding coupled with early maturing breeding lines.

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