



E-ISSN: 2278-4136

P-ISSN: 2349-8234

JPP 2019; 8(1): 1569-1571

Received: 23-11-2018

Accepted: 25-12-2018

BD Romade

Assistant Professor, Agricultural
Extension, Zonal Agricultural
Research Station, Igatpuri,
Nashik, Maharashtra, India

KD Bhoite

Assistant Professor, Agricultural
Botany, Zonal Agricultural
Research Station, Igatpuri,
Nashik, Maharashtra, India

SR Pardeshi

Assistant Professor, Plant
Pathology, Zonal Agricultural
Research Station, Igatpuri,
Nashik, Maharashtra, India

Impact of front line demonstration on production and productivity of Niger [*Guizotia abyssinica* (L.f.) Cass] in western ghat zone of Maharashtra

BD Romade, KD Bhoite and SR Pardeshi

Abstract

Niger is an edible oilseed crop of tribal farmers of Western Ghat zone of Maharashtra. It supplements to the socio-economic condition and fulfils the requirement of cooking oil of the Indian tribal community. The production and productivity of Niger crop continues to be quite low due to socio-economic and agro-ecological situations, low levels of management in crop production, cultivation in poor marginal lands and repeated use of local cultivars and predominantly under marginal conditions of small-holder agriculture. Drought, broadcast sowing, improper plant population, low input management, cuscuta, lodging due to high wind and rain are the causes of low productivity. The yield of Niger can be increased by demonstrating the improved agronomic package of practices *viz.* timely sowing of the crop, proper nutrient management, weed management and need based plant protection measures at the farmer's field under the keen supervision of concern scientists working in the operational area. Keeping in view, the front line demonstration was conducted on Phule Karala, Phule Vaitrana and Phule Sahyadri variety of Niger crop, under All India Coordinated Research Project on Niger operating at Zonal Agricultural Research Station (ZARS), Igatpuri Dist. Nashik in farmer's field for a consecutive year from 2012–13 to 2016–17. The increase in seed yield of 73.40%, 41.37% and 27.54% with cost benefit ratio of 1.75, 1.95 and 1.88 was obtained from front line demonstration on whole package, fertilizer application and line sowing over farmer's practices respectively. It can be concluded that FLD programme on Niger effectively increase the production and productivity in the specific region of Maharashtra.

Keywords: Niger, front line demonstration, yield, B: C ratio

1. Introduction

Niger [*Guizotia abyssinica* (L.f.) Cass] is an important edible oilseed crop of Indian tribal communities, which contains edible oil 38–43%, protein 20% and sugar 12%. As because Niger can be grown with minimum agro inputs, it is considered to be a crop for resources poor farmers particularly in developing countries like India. India is the chief producer of Niger seeds which ranks second and fourth position in the world for its acreage and annual production respectively (Dalei *et al.*, 2014) [1]. It is grown in the states of Madhya Pradesh, Chhattisgarh, Odisha and Maharashtra and to a lesser extent in Karnataka, Bihar, Jharkhand, Gujarat and Andhra Pradesh. During 2017-18 in Maharashtra it was grown in an area of 0.18 lakh ha with a production of 46 thousand tonnes and productivity of 255 kg/ha⁻¹ (Chief Statistician, Commissioner ate of Agriculture, Pune-1). The Niger seed has nearly 40% of oil which is used in foods, paints, soft soaps, lighting, lubrication and cosmetics (DOR, 2013) [3]. In India about 75% of the harvested seeds are used for oil extraction and the rest is exported for bird food. Roasted or fried seeds are eaten as snacks or used as a condiment. The press cake after oil extraction contains 31–40% protein and is used as cattle feed.

Since, the crop is cultivated by poor tribal farmers in the interiors of villages in scattered fields, the extension agencies could not work efficiently in providing the necessary package of practices to the farmers besides quality seed and required inputs. Thus frontline demonstrations on farmer's field are helpful to show the potential of full package of practices and the component technologies has been an efficient method of technology transfer to farmers (DOR, 2013) [3]. The major objective of frontline demonstrations (FLDs) is to show the production potential and profitability of improved technologies vis-a-vis farmers practice under real farm situations. The area and production of Niger is very low in the state as compare to the national acreage and production. Thus the present frontline demonstrations were undertaken to evaluate the performance of recommended high yielding varieties and package of practices of Niger and to compare the yield level of farmers' field and FLD fields.

Correspondence**BD Romade**

Assistant Professor, Agricultural
Extension, Zonal Agricultural
Research Station, Igatpuri,
Nashik, Maharashtra, India

2. Materials and Methods

Front line demonstration on Niger was carried out under All India Coordinated Research Project on Niger operating Zonal Agricultural Research Station (ZARS), Igatpuri, Dist. Nashik during *kharif* seasons of 2012–13 to 2016-17 on three components *viz.* whole package, fertilizer application and line sowing in 12 villages namely Bamlewadi, Mohimewadi, Asali, Bijaripati, Kanjale, Nagoslee, Vasili, Bharur, Vaghare and Ashakiranwadi from Nashik district, Dolara and Mokhada villages from Palghar district in Maharashtra. The demonstration plots are located at 20° North latitude with 74° East longitude and altitude of 599 meter above mean sea level with an annual average rainfall of 2750 mm. A total number of one hundred and fifteen beneficiary farmers were associated under this programme. The demonstration of improved technologies was taken in an area of 0.4 ha of each farmer. In each demonstration one control plot was kept where farmers' practices were carried out. The critical inputs such as seed, fertilizers and pesticides were supplied to the farmers free of cost for demonstration purpose. Adoption of improved technology by the farmers and guidance was ensured through regular visits by the scientists to the demonstration fields. Field days and group meetings were organized at the site of demonstration to provide the opportunities for other farmers to see the benefit of demonstrated technologies. The feedbacks from the farmers were utilized for further improvement in research and extension programme. Data were collected from the FLDs farmers and analyzed with statistical tools to compare the performance of farmer's field and FLDs field.

3. Results and Discussion

3.1. Whole package

The data in Table 1 revealed that the seed yield was 334 kg/ha⁻¹ in the demonstration plot and 190 kg/ha⁻¹ in farmers practice. The seed yield increase by 73.40% in the demonstration plot as compared to farmers practice. The increase in seed yield in the demonstration plot is mainly due to adoption of appropriate package of practices. These results are on conformity with the finding of B.M. Kushare and U.G. Sahane (2011) [4]. These findings are also in conformity with findings of Dalei *et al.* (2016) [1] and Patil *et al.* (2010) [6] in other oil seed crop.

3.2. Fertilizer application

The data in Table 1 indicated that the seed yield was 297 kg/ha⁻¹ in the demonstration plot and 208 kg/ha⁻¹ in farmers practice. The seed yield increased by 41.37% in the demonstration plot as compared to farmer practice. The increase in seed yield in demonstration plot might be mostly due to the use of recommended dose fertilizer 40 kg N, 20 kg P and 20 kg sulphur per ha. The results of this study are in conformity with the findings of the study carried out by Meena *et al.* (2012) [5].

3.3. Line sowing

The data in Table 1 revealed that the seed yield of Niger was 245 kg ha⁻¹ under demonstration plot and 191 kg/ha⁻¹ under farmers practice. The increase in yield of demonstration plot was 27.54% over farmers practice due to line sowing of Niger crop.

Table 1: Performance of improved technology on the productivity potentials of Niger (mean data of 2012–16)

Components of technology	No. of Farmers	Total area (ha)	Yield (kg ha ⁻¹)		% increase in yield over farmers practice
			FLD	FP	
Whole package	80	32.0	334	190	73.40
Fertilizer application	15	6.0	297	208	41.37
Line sowing	20	8.0	245	191	27.54

The economic analysis given in Table-2 indicates that in whole package the cost of cultivation is Rs.10825/- ha⁻¹ with net return of Rs.8282/- and B:C ratio 1.75 under demonstration plot as against cost of cultivation Rs.7169/- ha⁻¹ with net return of Rs.3825/- and B:C Ratio 1.53 under farmers practice. In fertilizer application the cost of cultivation is Rs.8173/- ha⁻¹ with net return of Rs.7810/- ha⁻¹ and B:C ratio 1.95 under demonstration plot as compared to

the cost of cultivation 6893/- ha⁻¹ with net return ` Rs.4408/- ha⁻¹ and B:C ratio 1.63 under farmer practice. In line sowing the cost of cultivation is Rs.6940/- ha⁻¹ with net return of Rs.6170/- ha⁻¹ and B:C ratio 1.88 whereas the cost of cultivation is Rs.6667/- ha⁻¹ with net return of ` Rs.3610/- ha⁻¹ and B:C ratio 1.54 under farmers practice. These results are in conformity with the findings of Dalei *et al.* (2016) [1] and Kushore *et al.* (2011) [4].

Table 2: Economics of FLD on Niger with respect to whole package, fertilizer application and line sowing (mean data of 2012–16)

Technology/ Practice	Cost of cultivation (ha ⁻¹) (Rs.)	Gross Monetary Return (ha ⁻¹) (Rs.)	Net Monetary Return (ha ⁻¹) (Rs.)	B:C Ratio
Whole package				
IT	10825	19113	8282	1.75
FP	7169	10994	3825	1.53
Fertilizer application				
IT	8173	15983	7810	1.95
FP	6893	11302	4408	1.63
Line sowing				
IT	6940	13110	6170	1.88
FP	6667	10277	3610	1.54

*IT= Improved technology **FP= Farmers practice

4. Conclusion

Front line demonstration on improved package of practices of Niger crop increase the yield potential up to a great extent and the impact of FLD programme on the same crop effectively

increase the production and productivity of Niger in the specific region of western ghat zone of Maharashtra which provide a better socio-economic security to the Niger growing farmers of the region.

5. Acknowledgment

We are greatly acknowledged the Associate Director of Research (ZARS), Igatpuri, for providing the infrastructure facilities to carry out the research work. We are also grateful to the Project Coordinator, All India Coordinated Research Project on Sesame and Niger (ICAR), JNKVV Campus, Jabalpur for providing the financial support to carry out the research work.

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